Canadian Journal of PUBLIC HEALTH

Revue canadienne d'Hygiène publique

Volume 52 FEBRUARY 1961 Number 2

Published Monthly by the

CANADIAN PUBLIC HEALTH ASSOCIATION

150 COLLEGE STREET, TORONTO 5

SCHOOL OF HYGIENE

UNIVERSITY OF TORONTO

Instruction in Public Health Subjects for Postgraduates

COURSES AVAILABLE

Diploma in Public Health (D.P.H.)
Diploma in Industrial Health (D.I.H.)
Diploma in Veterinary Public Health (D.V.P.H.)
Diploma in Dental Public Health (D.D.P.H.)
Diploma in Hospital Administration (Dip.H.A.)
Diploma in Bacteriology (Dip. Bact.)
Diploma in Nutrition (Dip. Nutrit.)
Certificate in Public Health (C.P.H.)

COURSES OPEN TO PHYSICIANS

Physicians may enrol in the D.P.H., D.I.H., Dip.H.A., Dip. Bact., and Dip. Nutrit. courses.

The *Diploma in Public Health* course provides instruction for physicians entering the field of Public Health as Medical Officers of Health.

The *Diploma in Industrial Health* course provides instruction for physicians entering the field of industrial health, either as full-time or part-time medical officers in plants or industrial organizations.

The *Diploma in Hospital Administration* course provides instruction for physicians and other university graduates seeking careers as hospital administrators.

The *Diploma in Bacteriology* course provides instruction in the following branches of medical microbiology: bacteriology, virology, immunology, sanitary bacteriology, mycology, and parasitology; a course in statistical methods forms part of the curriculum.

The *Diploma in Nutrition* course provides instruction in nutrition for physicians and other university graduates. The curriculum includes courses on basic and applied nutrition, and courses on anthropology, sociology, statistical methods, and public health administration.

A year of attendance at the School of Hygiene, provided a Diploma is obtained, satisfies part of the requirements for the Certification or Fellowship programs of the Royal College of Physicians and Surgeons of Canada in the approved medical specialties.

COURSES OPEN TO VETERINARIANS AND DENTISTS

Veterinarians may enrol in the D.V.P.H. and Dip. Bact. courses.
Dentists may enrol in the D.D.P.H., Dip. Bact., and Dip. Nutrit. courses.

COURSES OPEN TO OTHER UNIVERSITY GRADUATES

Graduates who have taken appropriate undergraduate courses may enrol in the Dip.H.A., Dip. Bact., Dip. Nutrit., or C.P.H. courses.

The *Certificate in Public Health* may be taken as a general course in public health administration, or with specialized work in public health subjects.

SPECIAL STUDENTS

Graduates, with acceptable experience, may apply for registration in the School of Hygiene as Special Students to take one or more subjects of instruction.

DURATION OF COURSES

All courses are of 32 weeks' duration, except the Dip.H.A. which extends over two years. Courses commence in early September of each year.

BURSARY ASSISTANCE AND FELLOWSHIPS

Bursary assistance may be available to candidates approved by Provincial Departments of Health. Overseas candidates should consult their government about Fellowships.

FOR FURTHER INFORMATION write to: Dr. A. J. Rhodes,
Director, School of Hygiene, University of Toronto, Toronto 5, Ontario.

Canadian Journal of
PUBLIC HEALTH

VOLUME 52 FEBRUARY 1961 NUMBER 2

Public Health Aspects of Live Poliovirus Vaccines with Particular Reference to Canada

A. J. RHODES,[1] M.D., F.R.C.P. (Edin.), F.R.S.C.

RECENT progress in the use of live poliovirus vaccines in many parts of the world has been both rapid and impressive.* Many reports on the subject have been published, and in 1960 there were several important international meetings at which immunization against polio was discussed.

Live poliovirus vaccine made from the strains developed by Dr. Albert Sabin of Cincinnati was used in Canada during 1960 on a research basis, and will be used on a wider scale in 1961.

These developments demand the attention of all public health workers in Canada, and the author has undertaken to review concisely some recent reports of special significance for Canada, and to discuss problems particular to Canadian public health practice. Reference will also be made to the report of the World Health Organization Expert Committee on Poliomyelitis, recently published (33). The major recommendations of the Canadian National Technical Advisory Committee on Live Poliovirus Vaccines made to the Dominion Council of Health in 1960 will also be presented.

The Present Use of Salk Poliomyelitis Vaccine in Canada

In Canada, extensive use has been made of the Salk type inactivated poliovirus vaccine, and it has been estimated that up to June 1960 some 69% of Canadians aged 0–39 had received three or more doses (17). Canadian public health workers have had a particular interest in this product, for much of the early developmental work was carried out in the Connaught Medical Research

[1]Director, School of Hygiene, University of Toronto, Toronto, Ont. Chairman, Canadian National Technical Advisory Committee on Live Poliovirus Vaccines.

*This subject of live poliovirus vaccines has recently been comprehensively reviewed by van Rooyen and Ozere (29), whose paper is commended to all interested persons.

Laboratories, Toronto (9, 25), with the assistance of the National Foundation for Infantile Paralysis. Evidence of this interest was expressed as long ago as 1954 when the Canadian provinces of Alberta and Manitoba and the City of Halifax, Nova Scotia, participated in the original controlled trial of Salk vaccine, organized and directed by Dr. T. Francis, Jr., of the University of Michigan. This trial conclusively demonstrated the protective capacity of Salk vaccine against paralytic poliomyelitis (11).

Lossing (19, 20) reported a satisfactory preventive action of Salk vaccine in 1955 and 1956 in Canada, and the efficacy of Canadian-produced Salk vaccine, when administered in a full course, was further established in an extensive field and laboratory study sponsored by the Ontario Department of Health and extending over the years 1955 to 1957 (3).

Subsequent Canadian reports have confirmed Francis's original estimates of efficacy of more than 80% (2, 6, 31). Kubryk (17) recently estimated the overall percentage effectiveness of three or more doses to be 95.6%, but this varied with the age group, as follows: 0–4, 87.4%; 5–19, 97.1%; 20–39, 73.7%.

Recent experience serves to remind us that there are no grounds for complacency about the Canadian polio situation (17, 34). In 1959 there were 1,870 paralytic polio cases, with 178 deaths; among the 1,698 cases where vaccination status and age were reported, 11.2% (193 cases) had received three doses of vaccine (17). These failures are unexplained and serve as a challenge to the practical immunologist to devise a better Salk vaccine or to perfect a live vaccine.

Fortunately, there are good reasons to claim that both the usefulness and antigenicity of the original type of Salk vaccine can be improved. Thus combined antigens, such as the quadruple product containing diphtheria and tetanus toxoids with pertussis and poliomyelitis vaccines, have been widely adopted in Canada for infants and pre-school children; a triple product in which pertussis vaccine is omitted, is being used in school children (10, 30). There are many practical advantages in public health work in the use of these combined antigens.

A group in the United States has improved antigenicity of killed virus vaccine by the use of a concentrated, purified, and standardized preparation of virus, which gives excellent antibody response after only two injections at an interval of one month (13). This product is still in the experimental stage, but the results of its use are most encouraging.

There are good grounds, therefore, for continued endorsement of Salk vaccine for public health programs in Canada, since it is a potent prophylactic when administered in a full course. There is reason to expect that the antigenic potency of killed virus vaccine can be considerably increased, and that this should make the product even more effective.

Live Poliovirus Vaccines

It is unlikely that in Canada for some time to come there will be any major change in the official policy of use of Salk type vaccine as the product of choice in elective public health immunization programs. It is appropriate,

nevertheless, that investigations should now be conducted on the role of the live vaccine. Furthermore, polio is emerging as one of the major epidemic diseases in the developing countries of Latin America, Africa, and Asia. Live vaccine has considerable advantages for use in these countries. Canada has a moral obligation to export to such countries live vaccine required for the control of polio.

As an indication of the interest of the Department of National Health and Welfare in the live type of polio vaccine an Advisory Committee has been established to keep the problem under continuous review and to make recommendations to the Dominion Council of Health.* This Committee met on several occasions during 1960 and has already recommended the trial of live vaccines on a limited scale to the Dominion Council of Health.

Strains of Live Polioviruses

To many, progress in the development of live poliovirus vaccines must seem very rapid, yet it is often forgotten that the first trials were in fact carried out over ten years ago by Koprowski, Jervis, and Norton (16), before the development of the Salk vaccine (15).

The three sets of live attenuated polioviruses which have been widely used are shown in Table I (33).

TABLE I—LIVE ATTENUATED POLIOVIRUS STRAINS

	Name of Poliovirus Strain		
Developer of Vaccine	Type 1	Type 2	Type 3
Koprowski	Wistar-Chat	—*	Wistar-Fox
Cox (Lederle)	Lederle-SM	Lederle-MEF	Lederle-Fox
Sabin	L. Sc. 2ab	P712, Ch 2 ab	Leon, 12 ab

*Koprowski's TN or P712 Type 2 strains have not been used on a wide scale.

The basic procedure in the development of all of these strains has been the adaptation of virulent polioviruses to growth in animals, eggs, or tissue cultures. The viruses have been attenuated so that they have lost almost all original capacity to infect and damage the nervous system of monkeys (neurovirulence).

Salk vaccine contains noninfectious virus particles that stimulate the production of blood antibody but not resistance of the gastro-intestinal tract. In contrast, live attenuated viruses, given by mouth, infect the gastro-intestinal tract, and stimulate antibody. This infection resembles the normal process of "silent" subclinical infection with "wild" polioviruses that occurs in nature, and which confers resistance on the majority of the population.

*The members of this Committee are Dr. A. J. Rhodes, Toronto, Chairman; Dr. E. W. R. Best, Ottawa, Secretary; Dr. J. K. W. Ferguson, Toronto; Dr. A. R. Foley, Quebec City; Dr. D. Kubryk, Ottawa; Dr. W. H. le Riche, Toronto; Dr. F. P. Nagler, Ottawa; Dr. V. Pavilanis, Montreal; Dr. C. E. van Rooyen, Halifax; and Dr. J. C. Wilt, Winnipeg. Dr. R. J. Wilson and Dr. D. R. E. MacLeod, Toronto, and Dr. R. Belcourt, Quebec City, serve as consultants on field trials. The Committee also had the benefit of consultation with Dr. A. Frappier, Montreal; and Dr. L. Greenberg, Ottawa.

In nature, however, as Sabin has recently emphasized, there is a price to pay for the benefits of this subclinical immunization with wild viruses—the price being some cases in which the usual "silent" infection expresses itself by frank paralysis (28).

World Use of Live Poliovirus Vaccines

On the assumption that polioviruses of reduced neurovirulence for monkeys are also of reduced neurovirulence for man, and following satisfactory local trials, live vaccines have now been used on a community- and nation-wide scale (1, 7, 8, 14, 18, 21, 22, 23, 27, 28).

The Koprowski viruses have been administered in Africa, Poland, and the U.S.A. The Cox-Lederle viruses have been employed in Latin America, Europe, and the U.S.A. The Sabin viruses have been used on the most extensive scale, following endorsement by the Soviet virologists, Chumakov and Smorodintsev. In addition to use in the Soviet Union, the Sabin strains have been employed in China, Czechoslovakia, and other European countries, the U.S.A., Mexico, Singapore, Africa, and the United Kingdom.

An authoritative estimate in June 1960 referred to the use of the Koprowski strains in 7 millions of persons, the Cox-Lederle strains in 2 millions, and the Sabin strains in over 50 millions (33). These figures have subsequently been increased by some millions.

The Sabin strains have been made available for manufacture of vaccine to the Connaught Medical Research Laboratories, University of Toronto, and the Institute of Microbiology and Hygiene, University of Montreal.

Within the last few months several conferences on live vaccines have taken place. In May 1960 an International Meeting of the Academy of Medical Sciences of the U.S.S.R. was held in Moscow (1).* Prior to this meeting, groups of United States and Soviet investigators and health administrators met in Moscow (1, 24).

In June 1960, the Pan American Health Organization convened the Second International Conference on Live Poliovirus Vaccines in Washington, D.C. (21).† Later in the same month, the World Health Organization called together for the third time an Expert Committee on Poliomyelitis (33).

Another important conference was the Fifth International Conference on Poliomyelitis, Copenhagen, July, 1960.‡ In November 1960, the World Health Organization convened a meeting of the Study Group on Requirements for Live Poliovirus Vaccines in Geneva.§

Advantages Claimed for Live Vaccines

Live attenuated virus vaccines have certain advantages over the inactivated vaccine for use in public health work, especially in countries where there is a shortage of doctors and nurses, or wherever there may be difficulty in reaching isolated communities. The chief advantages are as follows:

*Attended by Drs. Nagler and Rhodes.
†Attended by Drs. Nagler, Rhodes, and van Rooyen.
‡Attended by Drs. Ferguson, MacLeod, Nagler and Pavilanis.
§Attended by Dr. Nagler.

1. Live vaccines are simple to administer, since they are given by mouth as a syrup or liquid, or as a sugar candy. The vaccines have been used either as monovalent products, containing a single type, or as a trivalent mixture.
2. The cost of administration is low, as much of the work can be assigned to lay helpers.
3. The cost of production has been said to be less than that of the Salk type vaccine. It may be noted, however, that because of the necessarily stringent regulations governing the manufacture and testing of live vaccines, the cost of the final packaged product will be considerable, and may well be greater than that of Salk vaccine.
4. Infection with live viruses leads to the development of a state of local resistance of the gastro-intestinal tract that limits or prevents subsequent intestinal multiplication of virus on exposure to infection with wild virus. Salk type vaccine does not induce gastro-intestinal resistance.
5. Serum antibody develops quickly as a sequel to gastro-intestinal infection.
6. Since there is prompt development of serum antibody as well as of gastro-intestinal resistance, live vaccine may be used during an epidemic of polio, to prevent further spread of wild virus.

Certain factors may, however, considerably reduce the efficacy of live vaccines in the field, and it is realized that much has still to be learned about optimum dosage of the various strains, the scheduling of doses in persons of varying age groups, and the interfering effect of the various attenuated strains and of other enteroviruses one with another.

Safety of Live Poliovirus Vaccines

Live attenuated polioviruses have been developed from virulent polioviruses by special laboratory procedures. These attenuated strains show little or no evidence of virulence when inoculated into the brain of monkeys. It is essential that every possible step be taken to demonstrate that these live attenuated polioviruses are also safe for humans, following administration by mouth.

Safety of live attenuated viruses has to be considered not only for the person who actually swallows the vaccine, but also for close contacts who may become infected from the excreta of the person fed the vaccine.

The use of a live vaccine strain that spreads to persons other than those originally vaccinated is a radical departure from present practice in human preventive medicine, although common in veterinary medicine. It should be noted that vaccinia, another virus used in its live form as a vaccine, very seldom spreads to contacts, and that the attenuated 17 D and mouse brain adapted viruses used for prophylaxis of yellow fever are not transmissible by the mosquito *Aedes aegypti* that is the vector of virulent unmodified yellow fever virus.

Safety of live poliovirus vaccines is tested both in the laboratory and in field trials. With regard to laboratory tests, live attenuated viruses differ from live virulent viruses in several biological properties ("markers"), in-including degree of virulence for the monkey nervous system. It was hoped that some relatively simple laboratory test for markers, carried out in tissue

cultures and not in monkeys, might enable the virologist to measure the degree of neurovirulence of a strain. This hope has not however been realized, and it is still necessary in many studies of the properties of live attenuated viruses to resort to the inoculation of monkeys by different routes. This is costly and very time-consuming. No simple test has yet been found which correlates exactly with the results of monkey tests for neurovirulence.

A possibility is that the attenuated strains might regain some degree of their original neurovirulence during the biological process of multiplication in the intestine of the vaccinated person or of his close contacts. This aspect of safety has been studied in trials now completed in the Province of Quebec. The biological properties of all three of Sabin's strains, transferred on five or more occasions through the gastro-intestinal tract of humans, are now being investigated in the laboratory.

Safety of live poliovirus vaccines has also been tested in field trials, and on a truly gigantic scale. Many millions of persons in many parts of the world have now received attenuated polioviruses by mouth. Practically all the trials point to the high degree of safety of these attenuated viruses. However, the evaluation of the safety of these products has been rendered difficult in some instances because trials were conducted at times of sporadic or epidemic incidence of natural polio. If oral vaccines are given during epidemics, some cases of polio are bound to occur following the administration, without any relationship to the vaccine. In vaccine trials, any case of paralytic illness with onset between 5 and 30 days after the feeding of live poliovirus should be investigated epidemiologically and virologically. It should be remembered that both Coxsackie and ECHO viruses may cause paralytic illnesses clinically similar to paralytic polio.

To evaluate safety in an adequate fashion, it is clearly desirable that field trials of live poliovirus vaccines be conducted at times of the year when the tide of natural infection with polioviruses is at its ebb.

Many millions of persons have safely received oral vaccines, and among these persons there were very large numbers of seronegatives—those susceptible persons who had never before been exposed to live polioviruses and who had never received Salk vaccine. It has been clearly demonstrated that live vaccines can be fed to such susceptibles without a significant degree of risk. Most of the susceptibles so far given live virus have been children or teenagers. Comparatively few susceptible adults of over 20 years have yet been fed live polioviruses. It is partly for this reason that the World Health Organization Expert Committee (33), referring to countries with a polio pattern such as that in Canada, states that the accumulation of further data is desirable before the unlimited use of live vaccines can be recommended in persons of all ages on a community wide basis. It has been postulated that non-immune adults may develop a more severe infection with attenuated viruses than do non-immune children (4, 26).

It seems likely that Eskimos in Canada constitute a group requiring special consideration. The high degree of susceptibility of Eskimos to natural polio, influenza, and measles is well known. The serological studies of the author and his colleagues many years ago (32) showed that only a few of 90 Eskimos

of Pangnirtung, Baffin Island, in all age groups, had been exposed to natural polio infection. The more recent and more extensive studies of Hildes *et al.* (12) confirm the high incidence of seronegative susceptibles in several Canadian Eskimo communities sampled in 1957.

Canadian workers are impressed with the excellent record of safety of live poliovirus vaccines, and are accordingly proceeding to conduct relatively small scale trials in the polio "off-season," on a community basis, to acquire first-hand experience with these products.

Efficacy of Live Vaccines

Live vaccines exert their effects by multiplying in the gastro-intestinal tract and stimulating the production of serum antibody. Although the final proof of efficacy of live vaccines must come from the field as shown by the reduction in incidence of paralytic poliomyelitis, a useful indication of probable efficacy is afforded by study of virus excretion in the feces and of antibody development in the serum. The average duration of fecal excretion of live viruses is 4–6 weeks, and most of those who so excrete will develop serum antibody. If virus is not excreted in the feces, following oral administration, serum antibody is unlikely to develop.

The extent to which serum antibody has developed in those originally lacking it has varied considerably in different trials, and depends on strain of vaccine virus fed, dosage in terms of virus titer, and the local prevalence of Coxsackie, ECHO, and wild polioviruses acting as interfering agents. In general, it seems that the highest rates of conversion of individuals from seronegative to seropositive occur if each antigenic type of virus is fed separately. However, the practical advantages of a trivalent mixture are so great, that every effort must be made to develop a suitable mixture. Repetition will probably be necessary to insure the highest possible degree of conversion to the seropositive (immune) state.

The final proof of efficacy of any biological product comes not from the tests of the laboratory worker but from the data of the epidemiologist and vital statistician, which can show whether or not there is a reduced incidence of paralytic polio attributable to the use of the live vaccine.

For various reasons, but chiefly because live viruses spread to contacts, it has not generally proved feasible to plan controlled trials of the new product in which vaccine and placebo are given, as was done by Francis in the classic test of Salk vaccine in 1954 (11). Such evidence of efficacy of live virus vaccines as has already been accumulated from vital statistics is favourable, but much longer periods of observation are necessary before it can be stated that the use of live poliovirus vaccines achieves any greater reduction in incidence of polio than does Salk vaccine.

Eradication of Poliomyelitis

The term "eradication" has come into popular use in recent years and carries the connotation of complete elimination of the disease-producing agent from the community. There are those who believe that the eradication of polio is possible through the widespread use of live viruses. This is a bold

concept and is based on the belief that attenuated vaccine strains can permanently break the chain of infection with the wild paralyzing strains that circulate in nature. This has yet to be shown.

In eradication campaigns, it is recommended that feedings of live virus vaccine be given to the majority of the susceptible age group in a community, over a short period of time, so as to "blanket" the susceptible population with attenuated viruses. Feeding should probably be repeated. The administrative advantages of a trivalent mixture in such a campaign are obvious, although some workers prefer to use monovalent vaccines.

It would not seem that enough experience has yet been gathered in Canada to consider the launching of an eradication campaign. It is possible, however, that such a campaign might prove advantageous in certain parts of Newfoundland where most of the cases in 1959 were in the "under fives" (17). In such an area, an eradication campaign could be conducted by feeding as many as possible of the children in the susceptible age group.

Conclusions: Recommendations and Comments of the Canadian Advisory Committee

The Canadian Advisory Committee has already made a number of recommendations and comments to the Dominion Council of Health concerning the use in Canada of live poliovirus vaccines. Some of the recommendations have been carried out already and others will be implemented in 1961. Many of these recommendations have recently been endorsed independently by the Expert Committee of the World Health Organization (33).

The major recommendations and comments of the Canadian Committee are as follows:

1. That vaccination with live polioviruses be adopted in the face of epidemic poliomyelitis. The live vaccine should be administered over as brief a period of time as possible to as many as possible of those in the susceptible age groups. It is hoped that such a "blanketing" of the population with attenuated viruses will prevent the spread of the virulent epidemic strains.
2. That vaccination with live viruses of individuals who have failed to develop antibody after a full course of Salk vaccine be endorsed as a research project.
3. That vaccination with live virus vaccines of individuals of various ages in selected communities be conducted on a trial basis, in the winter months if possible, to seek information on the following aspects of the live vaccine problem that require clarification: the use of varying dosages of virus, scheduling of doses, relative value of trivalent and monovalent vaccines, duration of faecal excretion of virus, occurrence of viraemia, antibody response, ease of spread of virus to contacts, genetic stability of virus on transfer in the human host, and the effect of age on antibody response. The Committee hopes that such studies will provide the basic

data that will permit of official licensing of Canadian-produced live poliovirus vaccine.

4. That all studies with live polioviruses be under the supervision of an epidemiologist, a clinician, and a virologist with access to adequate laboratory facilities.
5. The Committee does not recommend the incorporation of live poliovirus vaccine into regular elective public health immunization programs at the present time. Not enough experience has yet been gathered in Canada to justify such a recommendation.
6. The Canadian Committee, like its counterpart committee in the United States, believes that in North America there will be a place for both live and killed polio vaccines in immunization programs, and that each product can complement the other (5).
7. The continued use of Salk vaccine in Canada in all age groups is endorsed and encouraged. Paralytic polio in Canada is now chiefly a disease of the unvaccinated and the undervaccinated.

The Committee therefore urges public health workers actively to seek out those members of the community who are not presenting themselves for Salk vaccine. The author personally considers that this is a clear responsibility of public health officers and cannot be delegated to private physicians, although these can contribute substantially to the overall program. There is, in the opinion of the author, no justification for limiting public programs to any special age group. Salk vaccine should be made available to babies, children, and adults.

REFERENCES

1. Academy of Medical Sciences, U.S.S.R., Institute for Poliomyelitis Research. The Main Results of the IV Scientific Conference of the Institute and the International Symposium on Live Poliovirus Vaccine, and The First Soviet-American Discussions of Problems Relating to the Control of Poliomyelitis. Moscow, 1960.
2. Brown, M. H.: Canad. Med. Assoc. J., 1959, *81*: 127.
3. Brown, W. G., Martin, G. K., Hannah, B., Rhodes, A. J., and Labzoffsky, N. A.: Canad. Med. Assoc. J., 1958, *79*: 155.
4. Burnet, Sir F. M. In Report of Second International Conference on Live Poliovirus Vaccines. 1960. Pan American Health Organization, Washington.
5. Burney, L. E.: Pub. Hlth. Rep., 1960, *75*: 869.
6. Cadham, R. C., and Davies, J. E.: Canad. Med. Assoc. J., 1958, *80*: 436.
7. Chumakov, M. P.: Report No. 2. Report to Academy of Medical Sciences of the U.S.S.R., Institute for Poliomyelitis Research, Moscow, 1960.
8. Cox, H. R., Cabasso, V. J., Embil, J., Markham, F. S., Moses, M. J., Moyer, A. W., Roca-Garcia, M., and Ruegsegger, J. M.: Bull. Acad. Med. New Jersey, 1960, *6*: 184.
9. Defries, R. D.: Canad. Med. Assoc. J., 1957, *77*: 663.
10. Ferguson, J. K. W.: Canad. J. Pub. Health, 1959, *50*: 385.
11. Francis, T., Jr., *et al.*: Evaluation of the 1954 Field Trial of Poliomyelitis Vaccine—Final Report. The National Foundation for Infantile Paralysis, New York, 1957.
12. Hildes, J. A., Wilt, J. C., and Stackiw, W.: Canad. J. Pub. Health, 1959, *50*: 148.
13. Hilleman, M. R., Charney, J., Tytell, A. A., Weihl, C., Cornfield, D., Ichter, J. T., Riley, H. D. Jr., and Huang, N.: Bull. Acad. Med. New Jersey, 1960, *6*: 106.
14. Horstmann, D. M.: Report on a visit to the U.S.S.R., Poland and Czechoslovakia to review work on live poliovirus vaccine, August-October 1959. Report to the World Health Organization, 1960.
15. Koprowski, H.: Trans. and Studies of College of Physicians of Philadelphia, 1960, *27*: 95.

16. Koprowski, H., Jervis, G. A., and Norton, T. W.: Am. J. Hyg., 1952, *55*: 108.
17. Kubryk, D.: Canad. J. Pub. Health, 1960, *51*: 389.
18. Lebrun, A., Cerf, J., Gelfand, H. M., Courtois, G., Plotkin, S. A., and Koprowski, H.: Bull. World Health Organization, 1960, *22*: 203.
19. Lossing, E. H.: Canad. J. Pub. Health, 1956, *47*: 104.
20. Lossing, E. H.: Canad. J. Pub. Health, 1957, *48*: 449.
21. Pan American Health Organization: Report of Second International Conference on Live Poliovirus Vaccines, Washington, D.C., 1960.
22. Pan American Sanitary Bureau: Report of First International Conference on Live Poliovirus Vaccines, Washington, D.C., 1959.
23. Plotkin, S. A., Lebrun, A., and Koprowski, H.: Bull. World Health Organization, 1960, *22*: 215.
24. Price, D. E. and Zhdanov, V. M.: U.S. Public Health Reports, 1960, *75*: 872.
25. Rhodes, A. J.: Canad. Med. Assoc. J., 1956, *75*: 48.
26. Rhodes, A. J.: Virus infections and congenital malformations. Proceedings of First International Conference on Congenital Malformations, London, July 1960.
27. Sabin, A. B.: Arch. Int. Med., 1960, *106*: 5.
28. Sabin, A. B., Ramos-Alvarez, M., Alvarez-Amezquita, J., Pelon, W., Michaels, R. H., Spigland, I., Koch, A. M., Barnes, J. M., and Rhim, J. S.: J. Amer. Med. Ass., 1960, *173*: 1521.
29. van Rooyen, C. E. and Ozere, R. L.: Canad. Med. Assoc. J., 1960, *82*: 759.
30. Wilson, R. J., Moss, G. W. O., Potter, F. C., and MacLeod, D. R. E.: Canad. Med. Assoc. J., 1959, *81*: 450.
31. Wilt, J. C., Creighton, R. M., Alcock, A. J. W., Stackiw, W., and Nagel, L.: Canad. Med. Assoc. J., 1959, *81*: 1.
32. Wood, W., Clark, E. M., Shimada, F. T., and Rhodes, A. J.: Canad. J. Biochem. Physiol., 1954, *32*: 119.
33. World Health Organization: Expert Committee on Poliomyelitis. Third Report. W.H.O. Tech. Rep. Series No. 203, 1960.
34. Young, D. G. and Sproule, B. J.: Canad. Med. Assoc. J., 1960, *83*: 1140.

The Relationship Between Occupational and Public Health Services[1]

STANLEY GREENHILL[2], M.D., D.P.H.

TODAY'S worker spends but one-third of his waking hours each week at his work place. The remaining two-thirds are spent in the community as one of its members. The work place and the community cannot be regarded as separate and distinct entities. There is a constant inter-action between the two.

An industrial plant is not just an edifice of steel and concrete. It is an integral part of the community in which it is located. In spite of technological advances and the march of automation, industry still employs people, utilizes raw materials, requires power and water, and disposes of waste. Its employees travel to work on the community's highways or use its transportation system. They live in its houses, and consume its electricity, gas, water and food. They are prone to the same strains, stresses, and illnesses as their neighbours. They are, in other words, integral parts of the social structure of the community.

Industry has a responsibility to and a role to play in this community. The plant's work environment must not be detrimental to its workers. Such factors as heat, light, and ventilation must be optimal for employee comfort. Hazards inherent in the transportation and handling of the raw materials must be eradicated. "House-keeping" standards in the plant must be kept high to minimize dangers at work. Gasses from stacks are no respecters of territorial rights and their possible ill effects will affect not only employees but everyone in the community. Wastes discharged into nearby waters do not respect the three-mile limit and may prove threats to others downstream. An outbreak of epidemic disease within the plant cannot be controlled by placing a plaque on the main gate. Obviously, close and friendly relations must exist between industry and local health authorities if an occupational health program is to be a success.

Health Services in Industry

The medical section of an industrial plant, with its nurse and physician, may be regarded as a threat by the medical practitioners in the area. The role and function of the industrial physician is but vaguely understood by the doctor in private practice. Instead of being a threat, an occupational health program with its emphasis on health maintenance and disease prevention inevitably results in increased utilization of existing medical facilities.

---

[1]Based on a paper read before the Alberta Division of the Canadian Public Health Association, September 8, 1960.

[2]Professor and Head, Department of Preventive Medicine, University of Alberta, Edmonton.

The resources of an industrial medical department can be of immeasurable help to the practising physician. It can provide much helpful diagnostic data—clinical, social and technical—regarding a patient. It can help in the management and rehabilitation of the sick or injured employee. It can co-operate in the social and emotional re-adjustment of the troubled or disabled worker. A medical practitioner utilizing the resources of an industrial medical department will inevitably practise a comprehensive type of medicine and therapy. This will be of benefit to himself, to the employee-patient, the industry and the community.

The industrial physician must have a broad approach to health and be more than just a clinical diagnostician. In addition, he must have some knowledge of manufacturing processes, the potential hazards in the materials used, and the healthiness or otherwise of the work place. His knowledge must extend into those intangible factors that affect the worker at his place of work, human relationships and group dynamics.

The industrial physician's clinical orientation is different from that of his colleague in private practice. His approach is "How well are you?" rather than the traditional ". . . and what ails you?". This twist in approach reflects a profound difference in attitude. It reflects an attitude health-orientated instead of disease-orientated. It is an attitude not yet apparent in undergraduate or postgraduate medical training. It does not assume pathology. It automatically assesses an individual's attributes, not deficiencies. It is an optimistic approach to an individual seeking medical advice.

A physician in an industrial setting soon realizes the complexity and multiplicity of factors contributing to a disease state. Medicine no longer is an isolated discipline restricted to a hospital or consulting-room setting. Medicine becomes a body of knowledge most at home among the social sciences. A comprehensive assessment of an individual demands some understanding of sociology, anthropology, psychiatry and economics as well as clinical medicine. The interpretation and compilation of such varied data require an elementary knowledge of biometry and epidemiological techniques. Disease etiology is no longer the single cause-and-effect phenomenon as believed by 19th century medical researchers and perpetuated in most of the standard medical texts of today.

The accumulation of such varied data is a slow process. Over a period of time a comprehensive picture of an individual or work situation gradually emerges.

The Industrial Nurse

The industrial nurse is a key figure in this process. She is more than just a mother-figure, dressed in white, applying bandages to her numerous charges. The nurse in industry, like her counterpart in public health, is a teacher but in addition she is counsellor and adviser. She is not a diagnostician, nor therapist. As a teacher she is both a propagandist and an antipropagandist.

As a propagandist the nurse outlines the scope and purpose of an industrial health program. She instructs in basic health rules. She listens to the employee. She encourages ventilation of personal problems. Not only will the industrial

nurse utilize the services of her own industrial physician in the management of personal and situational problems, but also the employee's private physician and the health and welfare resources of the community. This comprehensive approach benefits not only the employee, but also his family, his work group, the plant and the community.

As counter-propagandist the medical department is kept busy allaying the fears and anxieties nurtured by the spate of questionable health information spewed out by the press, glossy magazines, radio and television. The nurse and physician attempt to combat the well-motivated blandishments of individuals convinced that they have a monopoly on some esoteric, high-sounding disease with a depressingly high incidence. Innumerable lumps, bumps, and coloured spots have to be "de-cancerized." Self-diagnosed coronary attacks have to be "undiagnosed," blood pressures made "normal," eggs and egg-products "de-lecithinized," animal fats "de-cholesterolized," and psychoses demoted to neuroses. Parents have to be convinced that most children will eventually be socially acceptable adults.

This type of health supervision and maintenance is, in many respects, the opposite of the techniques employed by classical public health practices. Public health procedures emanate from a centralized authority for the benefit of the many. In occupational health programs data and clues are received from the many for the benefit of the individual. Public health may be regarded as the practice of preventive medicine for the benefit of the masses. Occupational health, on the other hand, may be regarded as individualized, comprehensive, and preventive medicine.

Community Health

With the employee spending but one-quarter of the total week at the place of work, it is natural that industry should be interested in the health hazards to which he is exposed during the remaining three-quarters.

It is economically advantageous for industry to be located in a healthy community. But what is a healthy community? Do any indices exist by which it is possible to judge the healthiness of an area? Surely death rates cannot be used as indices of health! But statisticians like death rates! Death is one state all doctors can diagnose without fear of contradiction, and statisticians are glad of it! Death rates and causes of death do supply data of value to the living. It is a fact that seventy per cent of all deaths are due to three causes—(1) diseases of the cardiovascular system, (2) cancer and (3) accidents. Deaths from the cardiovascular system and cancer reflect what we die from when public health practice and improved living standards remove most of the microbiological causes of death.

Accidents, third on the list, are another matter. Accidental deaths kill the young and the old, but also a good number of those in the most productive periods of life. The cost to industry of out-of-plant accidents and injuries is stupendous. The cost to the nation as a whole cannot be estimated, nor can the cost in suffering to family, relatives, and friends. The safest place to be nowadays is in an industrial plant. It is far safer to make atomic bombs or razor blades than to make a doll's house in the basement. It is safer to fly to

Aklavik or Timbuctu than to drive five miles to work each day. It is safer to make gunpowder than to cook dinner at home. Any industry can supply figures indicating the truth of such statements. Industry must be congratulated for its researches into the causation and epidemiology of accidents, and the practical application of the results. Safety education never ends in an industrial plant, and eventually safety attitudes take on the characteristics of a conditioned reflex. Automobile driving, weekend boating, "do-it-yourself" addiction, home hazards, and sports produce an ever-increasing toll of dead, maimed and injured. Industry would benefit from community-wide applications of its safety program.

Any disease that affects a worker's health and efficiency is of interest to industry. With the decline in the importance of communicable disease, new health problems, more complex in nature, have arisen to take their place. Though the rise in living standards and advances in medicine have relegated communicable disease to a minor role in the over-all health picture, this advance has been more than compensated for by the emergence of disease states not amenable to time-honoured preventive measures. The medico-socio-economic problems arising from chronic, degenerative, and emotional illnesses are tremendous in size and complexity. An appalling lack of knowledge exists with regard to such diseases. These diseases concern not only the individual, his family, community and industry, but also the nation. At a time when technological know-how and an adequate supply of trained personnel may make the difference between national sovereignty and subserviency, no country can afford to be indifferent to conditions draining the health and efficiency of its people.

Annual reports from departments of health fail to reflect this changing pattern of disease. There is a depressing similarity in format and content of today's annual health reports with those compiled in 1900. Yet an understanding of the epidemiology of these non-infectious diseases, and knowledge of their natural history, would not only help elucidate their complex etiologies but be of immense value to industry, health authorities, and governments. Admittedly, the compilations of such data would be consuming of time, money, and personnel, but a beginning could be made by public health workers in the course of their daily work.

A community's health is more than just the absence of disease. Industry is well aware of this. Socio-economic problems may result from the presence of industry in the community. On the other hand, local socio-economic problems may have a direct bearing on neighbouring industry. Inevitably this inter-play is reflected by pathology—organic, emotional, or social—in the community. Three examples of this inter-play come to mind.

Of interest both to the community and industry is the problem of the older worker. How effective are pre-retirement schemes and programs? Do such schemes and programs really prepare the older worker for that inevitable day when the alarm clock need no longer ring? How adaptable is the older worker to radical changes in production methods? What psycho-social problems arise after the gold watch, silver teapot, or raw-hide travelling bag has been duly presented? Can interests and hobbies replace the social milieu of the work

place? Does the changing pattern of disease, and the individual nature of the aging process, indicate retirement should no longer be based on a fixed chronological age? These important questions will remain unanswered until the pertinent information is compiled and tabulated. The answers will be of value to industry, to health authorities and to all levels of government.

The increasing number of married women in the labour force—28.3% of the total work force in Canada in 1958 were women—is of socio-medical significance. Too little is known of the effect on pre-school children when both parents work and parental authority is delegated to a relative or stranger. What behaviour patterns do such children develop? What are their scholastic accomplishments? Is it more important to provide children with the material things of life than parental love and discipline? At present, condemnation or justification of such practices tends to be based more on emotional or moralistic feelings than verifiable facts. The health worker is in an ideal position to clarify the situation by observation and tabulation.

If the younger married woman and her family are producing future socio-medical problems, so perhaps is the older married woman with her teen-age offspring. Women in the thirty- to fifty-year age group continue to seek re-employment. An empty house is no challenge to her capabilities. It is natural that she wishes to spend her free time at a satisfying and gainful occupation. Not all women gain satisfaction from coffee parties, teas and club meetings! Industry knows these women rapidly re-adapt to the work situation. Their absence rates are low and loyalties high. They are a stabilizing influence in any work force. But what effect does their absence from home have on adolescents experiencing the first twinges of adulthood? Do her offspring require her stabilizing influence at home to ensure a smoother emotional and social transition from puberty to adulthood? Once again the health worker in the field may provide the data to give the answer.

Industry obviously has interest in and would like more information on all these factors that determine the health of a community. Yet, how lacking is such information. This lack of information is difficult to understand in this era of surveys, polls, samples, and statistics. It is an era in which people, maybe out of boredom, appear eager to answer the queries of the pollster no matter how ridiculous the question or intimate the topic.

The vast majority of the population today are wage-earners. Apart from the size of the pay cheque, the most unskilled labourer and the highest-paid executive are in similar situations. Illness, accident or injury may well be a catastrophic event. The maintenance of accustomed living standards becomes dependent upon the wage cheque. The biggest threat to the maintenance of wage-earning capability is illness.

Nowadays people cannot afford to get sick. Still less can they afford to pay the full cost of their sickness. Present-day living seems to demand the immediate possession of the maximum number of material goods. If people cannot afford the luxury of illness, industry can afford the cost of sickness and absenteeism still less. Hence, the somewhat paradoxical situation of private enterprise adopting some of the practices of the welfare state! The cost of sickness benefits, hospitalization, pre-paid medical plans, in-plant medical services plus

other fringe benefits is the price for high morale and efficiency, and low sickness and labour turn-over rates. Economics rather than benevolence was the motivating force behind industry's adoption of such welfare benefits. Efficiency and productivity are dependent on the health and morale of the work force. In this era of keen business competition and conflicting ideologies, no private industry and no industrialized nation can hope to survive unless its work force has both health and high morale. The maintenance of health and the prevention of disease are of concern not only to private industry but also to the nation.

The presence or absence of a pathogen or pathology are not the sole determinants of health or disease. The problem of health and disease is not so simple. Many diverse etiological factors are at play. Some may be determined by the investigative procedures of modern clinical practice. Others are less tangible. They have to be sought outside the laboratory, outside the body, and outside the hospital. They are to be found in the patient's physical environment, his social and work milieu, his family setting, and his life history. These intangibles not only contribute to his feelings of ill-health, they may cause it and therapy must be directed to the satisfactory re-adjustment of social factors as well as to the eradication of objective disease or subjective symptoms. A comprehensive approach such as this utilizes the techniques of clinical and preventive medicine and the teachings of the social and behavioural sciences. The practical expression of this multidisciplinary concept of health and disease can best be observed in the occupational health programs of today.

Microbiological and Chemical Investigations of Outdoor Public Swimming Pools[1]

DONALD M. McLEAN,[2] JOHN R. BROWN[3] and MURRAY C. NIXON[4]

THROUGH the extensive use of outdoor public swimming pools for recreation during summer, an excellent opportunity for the spread of bacteria and viruses pathogenic for man is provided. This opportunity for dissemination of pathogenic microorganisms also exists on a limited basis through the use of indoor swimming pools which are operated during winter. For instance, during summer 1954 in Washington, D.C., an outbreak of pharyngoconjunctival fever, the main features of which were high fever, sore and inflamed throat, headache and follicular conjunctivitis, affected many persons who frequented one of two suburban swimming pools (1). Strains of Adenovirus-3 were recovered from throat or eye swabs of 80 patients. During summer 1955 in Toronto, an outbreak of pharyngoconjunctival fever due to infection with Adenovirus-7 was associated with the use of a swimming pool (2). In the outbreak of exanthem accompanied by pharyngeal lesions associated with infection by Coxsackie A16 virus (3) which affected 27 families living in a Toronto suburb during summer 1957, children aged less than 9 years were most frequently the first cases which occurred in a family. It seemed likely that these children contracted their infections during close contact at play, facilitated by widespread use of backyard swimming pools.

Microorganisms which are excreted through the eyes, nose, mouth, urine or faeces may gain access readily to swimming pool water. A high concentration of microorganisms may exist in water immediately surrounding a bather. Reduction of the number of organisms per unit volume, accompanied by rapid dispersion of organisms throughout the pool is induced by pumps used for recirculation of water and turbulence created by swimming, diving and wading of bathers. Chlorine is added continuously in attempt to render microorganisms non-infective. Regulations promulgated by the Department of Health for Ontario in 1944 (4) prescribe that the level of free residual chlorine in pool water shall be maintained at a level not less than 0.2 parts per million (ppm.) nor greater than 0.5 ppm. in a pool in which the temperature shall be raised to a temperature not exceeding 72° F.

Chlorine may be present in water either as the element (free residual chlorine), or in combination with ammonia as chloramines, or combined with

[1]Presented at the Christmas meeting of the Laboratory Section, Canadian Public Health Association, Ottawa, December 1–2, 1960.

[2]The Research Institute, The Hospital for Sick Children, Toronto.

[3]Department of Physiological Hygiene, University of Toronto.

[4]Section of Sanitary Bacteriology, Division of Laboratories, Department of Health for Ontario.

other nitrogenous organic matter (combined residual chlorine). Although a level of free residual chlorine 0.2 ppm. at pH7 and temperature 72° F is sufficient to inactivate Escherichia coli bacteria after contact for 10 minutes (5), these conditions may not inactivate all viruses. Whilst strains of the three antigenic types of Poliovirus, Coxsackie B1 and Coxsackie B5 were inactivated by free chlorine levels between 0.2 and 0.3 ppm. at pH7 and temperature 72° F (6), freshly isolated strains of Poliovirus 1 and a laboratory strain of Poliovirus 3 required 30 minutes' contact, whereas laboratory strains of Poliovirus 1 and the Coxsackie viruses were inactivated after 4 minutes' contact. At pH10, significantly longer contact times were required to achieve inactivation. However, combined residual chlorine was an ineffective virucidal agent since contact times of 3 hours were required for complete inactivation of Poliovirus 1 and Coxsackie B5 virus at pH7 by levels of 1.0 ppm. (7). A freshly isolated strain of Poliovirus 1 was inactivated less rapidly than laboratory-adapted strains of Poliovirus 1 and Coxsackie B5. A combined residual chlorine level of 9 ppm. reduced the contact time for inactivation of the freshly isolated Poliovirus 1 strain to 30 minutes. Adenovirus 3 was inactivated by concentrations of free residual chlorine similar to those found lethal to E. coli (8).

In view of lack of information on the effectiveness of chlorine as a virucidal agent in swimming pools under actual operating conditions, and following a report (9) that iodine 0.2 ppm. may be as efficient a bactericidal agent as free chlorine 0.2 ppm., virological and bacteriological investigations were carried out at two outdoor public swimming pools in the City of Toronto during summer 1960.

Whilst all swimming pools are fitted with pumps, filters and chlorination apparatus in order to circulate the entire contents of the pool every eight hours, two devices are in common use for disposal of the surface layer of water: (a) water which overflows into scum gutters is drained to waste (overflow-refill); (b) water which overflows into the scum gutters or on the deck is returned to the balancing tank, thereby entering the circulatory system of the pool immediately before filtration (recirculating). Thus, solutes in overflow-refill pools are being flushed out constantly by a supply of fresh water from city mains, but solutes and water in recirculating pools undergo virtually complete recirculation. On account of lack of information regarding variation in concentration of chemical constituents of pool water following continued use by bathers, chemical analyses of pool water were undertaken simultaneously with sampling for bacteriological and virological tests.

Methods and Materials

Two outdoor public swimming pools in the City of Toronto were selected for study during summer 1960. Pool No. 1, a large pool situated in a densely populated low socio-economic district, was fitted with scum gutters which drained overflow water to waste (overflow-refill pool). Pool No. 4, a smaller pool situated in a less densely populated higher socio-economic district was fitted with surface ports which drained overflow water to the balancing tank, thus providing a closed recirculation system (recirculating pool).

Samples of water were collected regularly on Wednesday morning of each week for 11 consecutive weeks commencing June 22, 1960. Samples were taken at four sites in each pool: surface water at the shallow end, water at the floor of the pool midway along its length, water in the hair strainer immediately before filtration and water immediately after filtration and chlorination.

Samples of water were held in screw-capped bottles which were transported to the laboratories in an insulated container which held the temperature at 40° F. The temperatures of the air and water and the levels of free and combined residual chlorine were measured at each pool at the time water samples were obtained.

Virological testing

Water samples were centrifuged at 8,000 r.p.m. for 30 minutes in a refrigerated centrifuge in order to deposit bacteria. Supernatant fluid 3.6 ml. was added to 0.4 ml. 10 X Ely medium,* and 1.0 ml. aliquots of mixture were inoculated immediately into each of four drained tubes containing tissue cultures of monkey kidney cells. After incubation at 37° C. for 1 hour, the fluid was removed from the tissue cultures and 1 ml. of 10 X Ely medium was added. The tubes were incubated on roller drums for 7 days at 37° C. (10), after which they were examined for evidence of cytopathic effect.

Bacteriological testing

Sodium thiosulphate (0.2 ml. of 10% aqueous solution) was added to each bottle of water (100 ml.) before collection in order to inactivate chlorine immediately. Estimations were made of the number of organisms per ml. by plate count, and the numbers of E. coli, other coliforms and enterococci per 100 ml. were determined (11).

Chemical testing

Estimations of the following constituents were made on samples of water collected before filtration and after filtration plus chlorination: free residual chlorine, combined residual chlorine, total nitrogen, ammonia nitrogen, organic nitrogen, albuminoid nitrogen, nitrate nitrogen and chloride (12).

Results

No virus was recovered from 88 samples of water which were tested. Studies on enteroviruses in Toronto during 1960 (13) showed that the typical summer epidemic of infections with these agents did not occur. Therefore, it is unlikely that sufficient subjects who used the pool would excrete amounts of virus likely to be detected in pool water.

In bacteriological tests, good correlation was obtained between the plate count per ml. and the most probable number per 100 ml. of E. coli and other coliforms. Coliform organisms were detected in 28 of 88 samples. E. coli was

*Ely medium: Earle's balanced salt solution with lactalbumin hydrolysate 0.5%, yeast extract 0.1%, penicillin 1000 units per ml. and streptomycin 500 micrograms per ml., glucose 0.1%, sodium bicarbonate 0.075%.

detected in only 11 of 28 samples which contained coliforms, and it was not detected in the absence of other coliforms. Enterococci were detected in 5 samples, 4 of which contained coliform organisms also. Although the level of free chlorine was maintained consistently at or above 0.2 ppm., a large concentration of coliform organisms was detected during the second, third and fourth weeks in both pools. Pool No. 1 showed further extensive bacterial contamination on the seventh, eighth and ninth weeks, and pool No. 4 contained many bacteria in water obtained before filtration on the tenth and eleventh weeks (Table 1). Contamination of the deep portion of the pool followed closely contamination of the surface layer. In pool No. 1 detection of bacteria in water before filtration parallelled closely the presence of bacteria in the superficial layer of pool water, and to some extent the deep also, but in pool No. 4 contamination was detected in water before filtration when water from the pool itself did not yield bacteria.

TABLE I—Coliform Content (most probable number of Coliforms per 100 ml.) of Water in two Public Swimming Pools

Pool	Sample site	June 22	29	July 6	13	20	27	Aug. 3	10	17	24	31
No. 1 (Overflow-refill)	surface	0	2.2	39.0	5.0	0	0	39+	15.0	15.0	0	2.2
	deep	0	2.2	39+	39.0	15.0	2.2	2.2	0	0	0	0
	before filtration	0	0	39.0	0	0	0	0	39+	15.0	0	0
	after filtration	0	0	0	0	0	0	0	0	0	0	0
No. 4 (Recirculating)	surface	0	0	0	0	0	0	0	0	0	0	0
	deep	0	0	39+	39+	5.0	2.2	0	0	0	0	0
	before filtration	39.0	0	39.0	0	2.2	0	0	2.2	0	39.0	39+
	after filtration	0	0	0	39+	0	5.0	0	0	0	0	0

Chemical analysis of the water samples obtained before and after filtration showed that there was no difference between the organic or inorganic constituents apart from the free chlorine which was added after the filtration process but before the sample was obtained. The pre-filtration samples did not contain any measurable amounts of free chlorine (the samples were received in the laboratory within one hour of collection and chlorine determinations made immediately).

The concentrations of ammonia nitrogen, albuminoid nitrogen, organic nitrogen, nitrate nitrogen and chloride were generally greater in pool No. 4 than in pool No. 1. There was a marked rise in organic nitrogen in pool No. 4 and a small rise in pool No. 1 during August (fig. 1). The concentration of chloride showed a general increase throughout the summer in pool No. 4, whereas pool No. 1 showed only minor variations in its chloride content (fig. 2). The concentration of free residual chlorine did not rise above 1.2 ppm. in pool No. 4 and 1.0 ppm. in pool No. 1.

The levels of nitrate nitrogen showed a marked decline in the month of August in both pools (fig. 3). The levels of free and combined chlorine are shown in fig. 4. In the month of August, the "free chlorine" levels declined in both pools, the decline being most marked in pool No. 4. These trends, however, were associated with a gradual increase in the levels of combined chlorine.

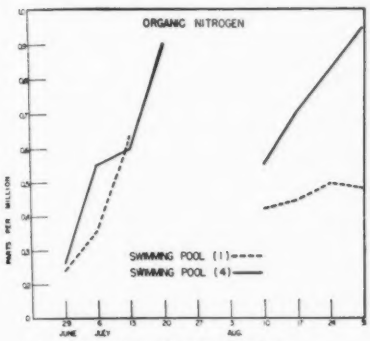


FIG.1 ORGANIC NITROGEN LEVELS IN TWO SWIMMING POOLS

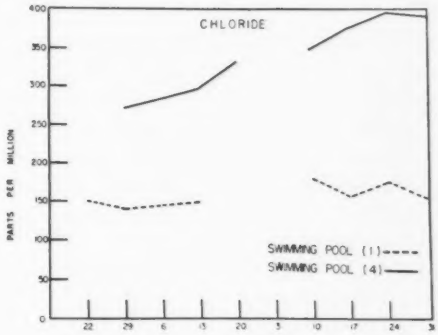


FIG.2 CHLORIDE LEVELS IN TWO SWIMMING POOLS

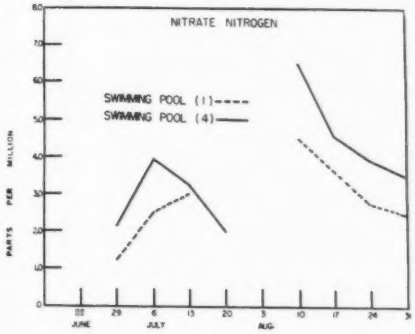


FIG.3 NITRATE NITROGEN LEVELS IN TWO SWIMMING POOLS

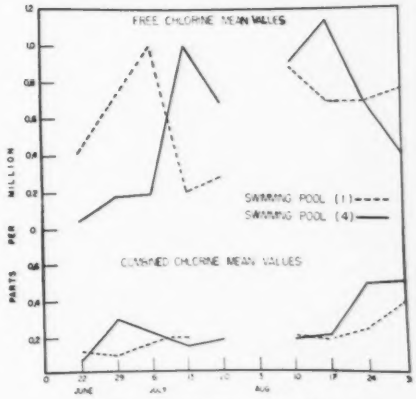


FIG.4 FREE RESIDUAL AND COMBINED RESIDUAL CHLORINE LEVELS IN TWO SWIMMING POOLS

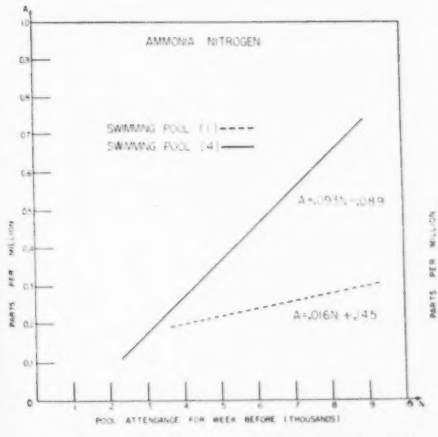


FIG.5 AMMONIA NITROGEN LEVEL AND POOL ATTENDANCE DURING PREVIOUS WEEK

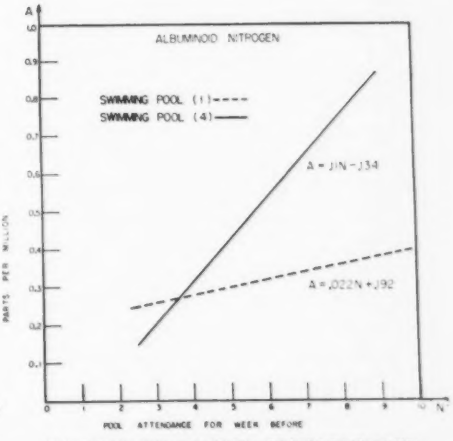


FIG.6 ALBUMINOID NITROGEN LEVEL AND POOL ATTENDANCE DURING PREVIOUS WEEK

The concentrations of ammonia nitrogen and albuminoid nitrogen were examined in respect of the number of bathers during the week previous to the collection of the samples. In pool No. 4 there was a significant correlation between the concentration of ammonia nitrogen and albuminoid nitrogen and the number of bathers. In pool No. 1 there was no significant correlation between either the ammonia or the albuminoid nitrogen content of the water (figs. 5 and 6).

Discussion

The accumulation of coliform bacteria including E. coli towards the end of summer in pool No. 4 (completely re-circulating), despite the level of free residual chlorine not being below 0.4 ppm., correlated well with increasing pollution by human excrement, as shown by steadily increasing concentrations of organic nitrogen, albuminoid nitrogen and ammonia nitrogen during the same period. Increase in coliform count did not occur in pool No. 1 (overflow-refill) towards the end of summer. During this period there was only a slight rise in levels of chloride, organic nitrogen and albuminoid and ammonia nitrogen. That the level of ammonia nitrogen was higher in pool No. 4 may be taken as indicative of a higher level of human contamination since urea is converted directly into free ammonia (15). In both pools during the last part of August there was a marked decrease in the concentration of nitrate nitrogen. This result is as yet unexplained, as it would be expected that the nitrate concentration would increase with increasing pollution of the bath. The levels of ammonia nitrogen and albuminoid nitrogen were considered in respect of the number of bathers using the pool the previous week and it was found that there was a good correlation between these parameters in pool No. 4 and a poor correlation in pool No. 1. This again supports the inference that there was a greater level in human contamination in pool No. 4.

Elevation of the level of free residual chlorine was followed by reduction in the number of coliforms before filtration. However, water from pool No. 1 showed a slight bacterial contamination of the superficial layer and water before filtration, even though the level of free-residual chlorine was held above 0.4 ppm., except on two occasions when the concentration was between 0.2 and 0.4 ppm. The greater number of bathers using pool No. 1, most of whom came from a low socio-economic district, may explain this slight and more persistent contamination with coliforms. Nevertheless pool No. 1 showed relatively minor changes in concentration of ammonia nitrogen, albuminoid nitrogen, organic nitrogen and chloride, which suggests that pollution by human excrement is removed more efficiently by constant flushing out with fresh water in an overflow-refill pool.

Similar concentrations of free residual chlorine (0.08–0.12 ppm.) will inactivate E. coli and Adenovirus 3 at approximately the same rate at pH7 and 25° C. (8), but the Polioviruses and Coxsackie B5 virus usually require free chlorine levels of 0.2 ppm. for 2 to 4 minutes to achieve inactivation under these conditions (6). Coxsackie A2 is 7 to 46 times more resistant to inactivation by chlorine than E. coli (14). Therefore, it may be expected that under present operational conditions that amounts of living

Adenoviruses and Polioviruses may reach detectable levels towards the end of summer in seasons during which these viruses are prevalent.

Summary

During summer 1960 coliform organisms and other enteric bacteria were recovered from two outdoor public swimming pools in Toronto despite levels of free residual chlorine which were maintained above 0.2 ppm. No virus was isolated from 88 samples of water, possibly owing to lack of prevalence of enteroviruses in the community. Whilst levels of ammonia nitrogen and organic nitrogen remained relatively unchanged in an overflow-refill pool, concentrations of these constituents increased steadily towards the end of summer in the recirculating pool.

Acknowledgements

This project was sponsored by the Swimming Pool Sanitation Committee of the Department of Health for Ontario. Committee members include Mr. W. M. Walkinshaw (chairman), Major A. S. O'Hara (secretary), Dr. J. R. Brown, Dr. N. A. Labzoffsky, Dr. D. M. McLean, Dr. G. W. O. Moss, Mr. M. C. Nixon, Mr. E. Sanderson and Dr. J. C. Sinclair.

The project was assisted with funds allocated by the Province of Ontario under the National Health Grants Program, Department of National Health and Welfare, Ottawa.

We are grateful to Dr. A. R. J. Boyd, Medical Officer of Health, City of Toronto, for support of this project, to Mr. B. Conery for collecting the water samples, and to the Department of Parks and Recreation, City of Toronto, for permission to use the swimming pools.

References

1. Bell, J. A. *et al.*: J.A.M.A., 1955, *157*: 1183.
2. Ormsby, H. L. and Aitchison, W. S.: Canad. M.A.J., 1955, *73*: 864.
3. Robinson, C. R. *et al.*: Canad. M.A.J., 1958, *79*, 615.
4. Regulations under the Public Health Act, Ontario, R.S.O. 1937, C.299 for the Construction and Management of Swimming Pools, October 17, 1944.
5. Butterfield, C. T. *et al.*: Pub. Health Rep., 1943, *58*: 1837.
6. Kelly, S. and Sanderson, W. W.: Am. J. Pub. Health, 1958, *48*: 1323.
7. Kelly, S. and Sanderson, W. W.: Am. J. Pub. Health, 1960, *50*: 14.
8. Clarke, N. A. *et al.*: Am. J. Hyg., 1956, *64*: 314.
9. Black, A. P. *et al.*: Am. J. Pub. Health, 1959, *49*: 1060.
10. McLean, D. M. *et al.*: Canad. M.A.J., 1958, *79*: 789.
11. Recommended Practice for Design, Equipment and Operation of Swimming Pools and other Public Bathing Places, 10th ed., A.P.H.A., 1957.
12. Standard Methods for the Examination of Water, Sewage and Industrial Wastes, 10th ed., A.P.H.A., 1955.
13. McLean, D. M.: in preparation.
14. Clarke, N. A. and Kabler, P. W.: Am. J. Hyg., 1954, *59*: 119.
15. Turneaure, F. E. and Russell, H. L.: Public Water Supplies, Requirements, resources, and the contamination of water. John Wiley and Sons, New York, 1946.

A Milk-Borne Epidemic of Typhoid Fever in Montmagny, Quebec, 1959[1]

Dr. A. DUMAS,[2] D.P.H., Dr. A. R. FOLEY,[3] Dr.P.H., and Dr. J. P. BRETON,[4] D.P.H.

IN March 1959, Montmagny, Quebec, suffered a serious typhoid epidemic; 197 cases being reported. Montmagny is a town with a population of 6,000, 35 miles east of Quebec on the south shore of the St. Lawrence River. It is the seat of the County of Montmagny.

All stricken persons, except nine, lived in Montmagny. Among these nine cases, five were visitors in homes where contaminated milk was consumed and four were secondary cases infected by a student, who, at the beginning of his illness before typhoid was diagnosed, left his boarding house in Montmagny and returned to his home. His four brothers and sisters developed typhoid fever.

Municipal waterworks: The town's water supply comes from a well-protected lake, about 10 miles from Montmagny. Regular analyses of the water have always shown the water to be free of pollution.

Municipal sewerage system: This is in good condition and the sewage is discharged directly into the St. Lawrence river without treatment.

Milk supply: A pasteurization plant has been in operation in Montmagny since 1945. At the time of the epidemic 1,200 quarts of pasteurized and 600 quarts of raw milk were sold daily in the town. The raw milk was distributed by four principal dairymen, two of whom lived in the town and two in the country. The two dairymen operating in the town obtained their water supply through the municipal waterworks, while the two rural dairymen had private wells in a fairly satisfactory state of protection. The four dairymen who sold raw milk had built suitable milkhouses, meeting the Health Department's standards, and they owned satisfactory equipment. Two of the dairymen, one in town and another in the country, had not been able to produce regularly a milk of proper bacteriological quality. Analyses of the milk of the dairymen involved in the epidemic had always indicated a product of suitable bacteriological quality.

Epidemiological findings

No cases of typhoid fever had occurred in the Montmagny area (town or rural outskirts) during the previous two years.

The county health unit was organized in 1941 and since that time one or two cases of typhoid fever were usually reported each year, always among residents on the banks of the Rivière-du-Sud who obtain their water supply from this polluted stream. Two of the dairymen who sold raw milk lived on the bank

[1]Presented at the 50th Annual Meeting of the Canadian Public Health Association, May 31–June 2, 1960, Halifax, N.S

[2]Medical Officer of Health, Montmagny.

[3]Epidemiologist, Ministry of Health, Province of Quebec.

[4]Health Unit of Bellechasse.

of the river. The particular phage type of the typhoid bacillus isolated during the epidemic had not been found among the sporadic typhoid cases in the Rivière-du-Sud area.

The occurrence of typhoid was first made known when a Montmagny medical practitioner notified the health unit office on March 11, 1959, that there were probably (serodiagnosis) 8 typhoid fever cases in the hospital. This was on a Saturday afternoon.

Immediately, the sanitary inspector sought out the names of the stricken persons and visited their homes. He found that all families among members of which typhoid fever was suspected were purchasing raw milk from the same dairyman. The supplier was at once forbidden to sell milk. The dairyman, astounded, willingly obeyed this order. He was, however, allowed to deliver his milk to the butter factory where cream was pasteurized at 190° F.

The sanitary inspector promptly visited the dairyman in order to continue his investigation. He learned that the dairyman's well had dried up over a month previously and that river water was used as a source of supply and for cleaning the dairy equipment. The water was not boiled. All members of the dairyman's family drank this water. For washing the dairy utensils, the dairyman added chlorine to the water in a more or less definite quantity. He left his utensils to dry, but before using his pails he rinsed them with the polluted water lest dust might have been deposited on them. There was no sterilization of utensils. The dairyman, warned previously of the danger of using river water, had forgotten, because he remained unconvinced. "Especially in winter," he said, "I did not believe that microbes could exist in ice-cold water." A son of the dairyman had been ill for two weeks but had not seen a physician. He had not taken to his bed but had continued to work in the dairy with all the other members of the family. Subsequently, eight of the ten persons in the family developed typhoid fever. The father and one son alone were spared although they were great consumers of raw milk.

The dairyman furnished a list of all his customers except one. This customer was a restaurant owner who had no right to serve raw milk. Every day new cases of typhoid fever were reported to us. The daily investigations in the families almost invariably showed that new cases were consumers of milk distributed by the dairy implicated.

Course of the epidemic

The occurrence of cases was as follows:

Week of March 1—9 cases
" " March 8—31 cases
" " March 18—41 cases (epidemiological investigation was begun)
" " March 22—37 cases
" " March 29—39 cases
" " April 5—16 cases
" " April 12—6 cases

Additional cases were reported at the rate of one or two a week from April 12 to June 14, 1959.

To complicate our investigation, we found twelve cases which, at first sight, we could not relate to the use of raw milk from this dairy. After a more thorough investigation it was established that the twelve persons had all eaten in the same restaurant and had drunk milk or had added some to their tea or

coffee. The restaurant operator admitted that he purchased small quantities of raw milk from the dairyman implicated and that he served some of it to those who preferred raw milk. The stricken customers, however, asserted that they had been served raw milk without having asked for it. The twelve cases were thereby related directly to the milk-borne epidemic.

It seems established that contaminated water from Rivière-du-Sud was the origin of the epidemic. Either the dairyman's son contaminated the milk while handling it during the ambulatory stage of his typhoid fever, or it was contaminated by containers soiled by the water from Rivière-du-Sud.

Distribution of cases

An important fact is that four typhoid cases occurred in the two neighbouring families who lived immediately downstream from the dairyman implicated during the epidemic. These two families obtained their water supply from the river. They produced their own milk and had no relations with the dairyman implicated. We may add that the etiological agent which was identified in these cases was a phage-type E-1, the one that was isolated from all other patients.

Typhoid fever cases were reported in 105 families. Ninety-eight of these received milk from the dairyman in question and among these, 87 cases occurred. The distribution of cases in the 105 families was as follows:

1 case—65 families
2 cases—13 families
3 cases—15 families
4 cases—4 families
5 cases—5 families
6 cases—2 families
8 cases (dairyman)—1 family

Eighteen children and five adults consumed the contaminated milk but did not develop typhoid fever.

The total number of cases was 197 and the age distribution was as follows:

0– 9 years—69 cases
10–19 " —54 "
20–29 " —28 "
30–39 " —17 "
40–49 " —13 "
50–59 " — 8 "
60–69 " — 6 "
70–79 " — 2 "

An eleven-month-old baby developed typhoid. He had been given raw milk.

Severity and complications

No deaths were recorded. No intestinal complications, perforations or haemorrhages were reported. Myocarditis was diagnosed in a few patients who recovered without sequelae.

Treatment

Chloromycetin, given orally, was used exclusively in the treatment. The dose was, generally, twelve 250 mg. capsules per day for adults. The dose for children was according to their weight. This treatment was continued for 3 or 4 weeks to avoid relapses. After 4 weeks a gradual reduction in dosage was employed and it was continued for 3 or 4 weeks. It is interesting to note that 14 patients had to continue taking chloromycetin for 2 to 3 months and 8 patients for more than 3 months.

Control measures

The sale of milk from the dairy involved was immediately stopped.

A visit was made by Dr. A. R. Foley to confer with local physicians at the hospital.

Typhoid-Paratyphoid vaccine was given to 1,270 persons in 3 injections; 153 persons had 2 injections and 157 received a single injection.

Hospitalization was urged and half of the stricken persons went to hospital.

Visits were immediately made to homes in which a case had been reported and a letter was sent to all families regarding the precautions to be taken against typhoid fever.

Samples taken:

We took 1,182 samples of feces and urine, an average of 6 per patient. On August 15, all persons from whom three successive negative samples had been obtained were released. Three families failed to send the last samples requested. In September, new samples on all former patients were again taken. Findings were positive in only one case, which case has remained positive.

RÉSUMÉ

Au mois de mars 1959, Montmagny fut le théâtre d'une importante épidémie de fièvre typhoide. 197 cas furent rapportés.

Tous les malades, moins 9, résidaient à Montmagny.

Ni l'eau d'alimentation, ni les égoûts ne pouvaient être la cause de l'épidémie. La lait cru fut incriminé.

Il se vendait alors 600 pintes de lait cru par jour. Ce lait état distribué par deux laitiers de la paroisse qui s'approvisionnaient d'eau dans des puits assez bien protégés; c'état des rivérins de la Rivière du Sud. Deux autres laitiers de lait cru s'approvisionnaient d'eau au moyen de l'aqueduc municipal.

Epidémiologie:

Presque à tous les ans, chez les riverins de la Rivière du Sud, on avait enregistré quelques cas de typhoide, chez des gens qui utilisaient l'eau de la rivière.

Alarme:

Elle fut donnée, lorsqu'un médecin avertit le bureau de l'Unité Sanitaire qu'il y avait probablement 8 cas de fièvre typhoide à l'Hôpital.

Une enquête dans les familles où il y avait des malades, démontra que les 8 familles achetaient du lait cru du même laitier.

Une visite chez le laitier, en cause nous apprit que son puits avait tari et qu'il avait dû prendre de l'eau dans la rivière pour le nettoyage de ses ustensiles. Les ustensiles n'étaient pas stérilisés après lavage avec cette eau polluée. Le laitier avait été averti du danger de se servir de cette eau, mais il n'était pas convaincu.

Un des fils du laitier incriminé a fait une typhoide ambulante et a continué à s'occuper du travail de laitier.

Chez tous les malades, on a pu retracer la même cause: le lait cru du laitier "M. un tel"

Cause de l'épidémie:

Ou le fils du laitier, travaillant à la manipulation du lait pendant sa typhoide ambulante, a contaminé le lait ou le lait a été contaminé par des récipients souillés par l'eau de la Rivière du Sud.

Traitement: chloromycétine.

Décès: Aucun décès ne fut enregistré.

Prélèvements: Tous les malades ont été libérés après 3 prélèvements négatifs. Un seul porteur de germes existait en septembre 1959.

A New Salmonella Serotype: S. canada (4,12; b-1,6)

J. A. YURACK,[1] RHODA M. LAIDLEY,[1] MARGARET FINLAYSON,[2] MARY FERGUSON[2]

NEW serotypes of the genus Salmonella are reported with some frequency in the literature. In 1959 no less than fifty-two were described (1). New types, however, have usually been identified first elsewhere than on the North American continent. In this instance a new serotype was isolated simultaneously in two widely separated areas of Canada. It soon spread through 8 of the 10 provinces and was isolated from a considerable number of cases and contacts.

From the first week of February, 1960, the Central Laboratory of the Division of Laboratories of the Ontario Department of Health made, or received from regional and hospital laboratories, a number of isolations of an organism which, at first, seemed to be a serological variant of *S. paratyphi B.* Several weeks later the Ontario Laboratories forwarded four of these strains to the National Salmonella Reference Centre at the Laboratory of Hygiene for investigation. At the same time the Laboratory of Hygiene received a similar organism from the British Columbia Laboratories which had also been isolated during the first week of February.

Independent bacteriological investigations were carried out by the Ontario Laboratories and the Laboratory of Hygiene. At the Laboratory of Hygiene four strains, two of those submitted by the Ontario Laboratories and the first two isolates forwarded from the British Columbia Laboratories were given a complete bacteriological and serological investigation. The results obtained by both laboratories were in complete agreement.

Bacteriological Findings

The organism was a gram-negative short bacillus, motile, with the typical biochemical reactions of the Salmonella group.

Biochemical Reactions

The test strains fermented arabinose, dextrose, dulcitol, galactose, laevulose, maltose, mannitol, mannose, sorbitol, trehalose and xylose with the production of acid and gas in 24 hours, while acid only was produced in rhamnose. The appearance of acid and gas in cellobiose was delayed, and a delayed production of acid only was observed in dextrin and glycerol. A delayed acid production was also observed in litmus milk. Adonitol, inositol, inulin, lactose, raffinose, salicin and sucrose were not fermented. Simmons' citrate, Christen-

[1]Laboratory of Hygiene, Department of National Health and Welfare, Ottawa, Ontario.
[2]Central Laboratory, Ontario Department of Health, Toronto, Ontario.

sen's citrate and Jordan's d-tartrate were utilized. H2S was produced on Triple Sugar Iron Agar. Indole was not produced. The Methyl Red Test was positive and acetylmethylcarbinol was not produced. Urea was not hydrolysed. Phenylalanine was not attacked, nor was malonate. The lysine-decarboxylase test (Carquist Ninhydrin) was positive. The lysine, arginine, ornithine decarboxylase tests (Moeller Method) were positive. No growth was observed in KCN medium and gelatin was not liquefied. Nitrate was reduced and Sterns Glycerol Fuchsin broth was positive. In the organic acid series of tests, d-, i- and l-tartrate were utilized, as were sodium citrate and mucate.

Serological Findings

S. typhimurium var *Copenhagen* (Str. #659) 4,12 O serum was agglutinated to titre by an O suspension of the new serotype and an antiserum prepared against the unknown culture was agglutinated to titre by a suspension of *S. typhimurium* var *Copenhagen* (Str. #659). However, the new type was not agglutinated by single factor "1," "5" or "27" sera.

In a series of reciprocal absorptions the unknown strain was able to remove all of the *O* agglutinins from *S. typhimurium* var *Copenhagen* (Str. #659) 4,12 serum, while *S. typhimurium* var *Copenhagen* (Str. #659) completely removed the *O* agglutinins from a serum prepared against the unknown. The somatic antigenic structure was thus established as 4,12. This result was confirmed by the Ontario Laboratories in a similar series of absorptions with the new serotype using *S. reading* (S93) as the known 4,12 strain for absorption instead of *S. typhimurium* var *Copenhagen*.

In some cultures both H phases were evident upon primary isolation, while in others only one phase was detected on first isolation but the second phase could be easily developed.

Absorption of an H serum prepared against phase 1 (b) of the unknown with *S. paratyphi B* phase 1 removed all H agglutinins for this phase. Similarly, a serum prepared against phase 1 of *S. montreal* (4,12;b-1,w) was completely absorbed by the new serotype in phase 1. Using another serum prepared against the new serotype, similar results were obtained by the Ontario Laboratories where similar absorptions were also carried out using a monophasic strain of *S. paratyphi B* var *Java* (4,5,12;b-) and a serum prepared against this strain. Hence phase 1 of the unknown was established as 'b'.

Absorption of an antiserum prepared against phase 2 of the test organism with *S. poona* phase 2 (1,6) removed all phase 2 agglutinins from this serum. Reciprocal absorption of *S. poona* phase 2 serum (1,6) with the unknown in phase 2 showed complete removal of agglutinins for this phase. These experiments, when repeated by the Ontario Laboratories with *S. london* phase 2 (1,6) and a serum prepared against phase 2 of *S. london*, gave similar results.

The complete antigenic structure of this organism is therefore 4,12;b-1,6.

This antigenic structure has been confirmed by Dr. Joan Taylor, Chief of the Salmonella Reference Laboratory, Central Public Health Laboratory, London, England, and Dr. F. Kauffmann, Director of the International Salmonella Center, Copenhagen, Denmark.

During this investigation the Laboratory of Hygiene forwarded to the

Quebec Ministry of Health seventeen isolates of this serotype from six provinces for possible phage typing. The strains all reacted similarly. They showed confluent lysis with *S. paratyphi BO* phage, and numerous plaques with phages Beccles and Taunton.

Epidemiological Findings

In Table I is shown the distribution of this serotype according to province and age. From February 1960 to August 1960 a total of 63 isolations have been reported.

TABLE I—Distribution of S. Canada by Province and Age

	Ill			Asymptomatic			No history			
	Age Group			Age Group			Age Group			
	0–5Y	6–12Y	Adult	0–5Y	6–12Y	Adult	0–5Y	Adult	Not known	Total
B.C.	8	2	2	2	3	2	2	—	1	22
Alta.	1	—	—	—	—	—	—	—	3	4
Sask.	—	—	1	—	—	1	—	—	—	2
Man.	—	—	1	—	—	—	—	—	—	1
Ont.	22	3	—	—	—	—	—	2	2	29
Que.	—	—	—	—	—	—	—	—	1	1
N.B.	—	1	—	—	—	—	—	—	—	1
N.S.	—	1	1	1	—	—	—	—	—	3
	31	7	5	3	3	3	2	2	7	63

British Columbia: The first specimen with a positive culture was isolated on February 2, 1960, but in one case, with positive culture, illness was first recorded on January 31. The reported isolations of this serotype were made in the south-west part of the province with only one exception. One case concerned a seven-year-old boy who developed pyelonephritis with hematuria and dysuria, the organism being isolated from his urine. Another case involved a nine-month-old baby, presumably an Indian, whose mother and five siblings, aged 3 to 12 years, were found to be asymptomatic excreters of this strain. This organism was isolated from the family contacts of three other cases, one of these contacts being a four-year-old asymptomatic carrier. All of the children affected suffered from diarrhoea and in most cases fever also. Of the 12 known ill patients, eight were five years of age or under.

Alberta: Four cases were reported. In only one was a history of the case reported—a five-year-old girl who arrived in Canada in April, 1959, from France. She was admitted to hospital with convulsions and a temperature of 105°. She had diarrhoea for two to three days but recovered following chloramphenicol therapy. From the scanty records available the first isolation of this type would appear to be April, 1960.

Saskatchewan: Two isolations were made in this province and both were from adults, one of whom was an asymptomatic contact of the other. The affected individual suffered with loose stools for five days in April, 1960, and had been admitted to hospital for gynecological examination after repeat post partum haemorrhages. Of 22 contacts of the case examined, only one was found to be a carrier.

Manitoba: The single isolation made in Manitoba was from an adult suffering from pyelitis and the organism was recovered from urine and stool specimens on June 4, 1960.

Ontario: The Ontario Laboratories report the isolation of this organism from 29 individuals. Some information was obtained on 24 of these, 11 of whom were hospitalized with severe gastroenteritis. A large proportion of those infected were below the age of five years and almost half were known to be less than two. All of the children involved suffered from some degree of diarrhoea, six had bloody stools and at least one had fever. One child was said to have had "chronic diarrhoea for two weeks" and in the case of a four-year-old the organism was recovered from urine rather than from faeces.

The cases were widely scattered over the province. Again there is evidence of the involvement of contacts of cases. In one instance three members of one family were affected and in another, three members of one household were concerned. In two other instances, two children in the family excreted the organism. One isolate was obtained from an adult at autopsy.

The Ontario Laboratories also observed that the children infected with this organism often remained carriers for a considerable period of time (Table 2) indicating that this strain is still a potential source of infection and is likely to remain so for some time.

Quebec: One isolate of this serotype was recovered from a stool specimen on May 3, 1960, but no history was obtained.

New Brunswick: One case of infection with this serotype was observed in a girl, 7 years of age. She was hospitalized from March 14–21 and before hospitalization suffered for three days with abdominal cramps and elevated temperature. The temperature remained elevated for five days and she was discharged afebrile and symptomless after seven days. There was no history of any infection in her family or among her playmates.

Nova Scotia: The first case was a five-and-a-half-year-old boy who was taken ill on March 15, 1960, with abdominal cramps, diarrhoea and vomitting. He was admitted to hospital on March 22 and was treated with chloramphenicol for eight days but was not discharged until April 13. His stool was positive on April 14 but negative on April 15 and 16. A sister, 7 years of age, had a history of diarrhoea during the early part of her brother's illness, but there is no record of any culture work.

The second case, a woman of 68, had diarrhoea and elevated temperature on July 14 and was admitted to hospital on July 19 where she was treated with chloramphenicol. Her stool was positive on July 25 and negative on August 1, 3, 6 and 30. A third culture of this serotype was recovered from the two-and-a-half-month-old grandson of the above case, but this baby showed no signs of any illness.

TABLE 2—Results of Cultural Examination of Faecal Samples of Some Patients

Patient	Age	Sex	February				March				April				May					June				July					August			
			7	14	21	28	6	13	20	27	3	10	17	24	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28
L.S.X	19 M	F	+	+			++																									
K.S.X	4 Y	M		−	−		++				+																					
G.T.	28 M	M	−		++		−+																									
K.R.	8 M	F		+++			+		+++													+								+	
J.S.	1 Yr	F			+		+																									
P.B.	2 Yr	F	+			+			−																							
T.B.X	4 Yr	F			+			+++	+				+			++			++			+			+	+			++			
M.B.X	19 M	M					+	+			+		+			+		+				+					−					
K.M.	13 M	F					+				+																					
M.G.XX	6 M	M													+		+															
P.G.XX	2 Wk	F													++		++		++					++	+	+	+		++			
G.T.	16 M	M											+				+−			−												
E.M.	4 Yr	F		+	−		+			+	+	−				+−		+	+													
J.L.	3 Yr	F								−						++			+	+					−	−						
S.B.	5 M	F																+		−												
J.Y.XX	3 Yr	F															+				+											

EACH + OR − indicates one sample X = Members of same family XX = Members of household.
One of negatives on G.T. received on same day as positive.

Discussion

The information available has failed to show any common source for the widespread distribution of this new serotype. One first thinks of some common widely dispensed food product. There is no concrete evidence which would implicate such a foodstuff as the source of infection, particularly one common to children, with the adult cases arising as a result of contacts, although this is not an impossibility. One might also speculate on the possibility of this organism being a variant of *S. paratyphi B* and arising as a mutation or series of simultaneous mutations.

Summary

A new Salmonella serotype, antigenic structure 4,12;b-1,6, is described. Because of the almost simultaneous isolation of this serotype in two widely separated areas, and the sudden and extensive spread of this organism the name *S. canada* is suggested.

REFERENCE

1. Kauffman, F.: Supplement to the Kauffman-White Scheme (III). Acta Path. et Microbiol. Scand., 1960, *49*: 89.

ACKNOWLEDGEMENTS

The authors wish to thank all those, too numerous to name, who have contributed to the publication of this report—the directors and bacteriologists of the provincial public health laboratories, regional and hospital laboratories who isolated the strains and submitted them for investigation, and the medical officers of health who submitted epidemiological information.

Limitations of Home Treatment of Tuberculosis[1]

W. R. BARCLAY[2], M.D.

THE tuberculosis picture has altered greatly in the last decade. The greatest changes have occurred in the area of treatment. Long periods of hospitalization, strict bed rest and collapse therapy have yielded to short hospitalization, ambulatory chemotherapy and surgical resection.

At the present time chemotherapy is administered for a longer period after hospitalization than it is during hospitalization. There is no universal agreement, however, concerning the necessity for initial hospitalization, its duration, nor the value of bed rest. What is required, I believe, is much greater individualization of treatment and some departure from standardized treatment regimens. There should also be a broadening of the indications for chemotherapy. In the future, the treatment of tuberculosis will be undertaken by physicians who specialize in thoracic diseases and the phthisiologist will disappear. Eventually hospitalization for tuberculosis will be undertaken in units of, or closely attached to, general hospitals and the TB sanatorium will be only a memory.

Physicians today who wish to undertake the ambulatory care of tuberculosis should have some specialized training in this disease. It is not a disease that every busy general practitioner is competent to treat. On the other hand, with some special training and sincere interest in the disease a private physician can very successfully manage treatment. In point of fact, most internists manage problems in internal medicine that are much more complicated and demanding than the therapy of tuberculosis. If we widen our concepts of the kind of tuberculosis that requires treatment we shall see that the private physician has acquired a most important role in both case finding and therapy.

I believe that antituberculosis chemotherapy should be given to all tuberculin positive pre-school age children, to all known recent tuberculin convertors, to tuberculin positive individuals who must receive long and continuous courses of corticosteroid therapy or who are suffering from chronic debilitating illness such as malignancies and finally to those with far advanced tuberculosis who had their disease arrested prior to the use of isoniazid therapy. These groups of people are most apt to be recognized by the private physician and they can have treatment initiated with isoniazid alone without a period of hospitalization. Patients with minimal pulmonary tuberculosis and no tubercle bacilli isolated may also be suitable for the initiation of ambulatory therapy.

---

[1]Presented at the annual meeting of the Canadian Thoracic Society, Ottawa, Ont., June 1960.

[2]Associate Professor of Medicine, School of Medicine, University of Chicago, Chicago, Illinois, U.S.A.

Other types of tuberculosis are best treated by initial hospitalization. This is desirable for many reasons. First, we cannot lose sight of the fact that tuberculosis is an infectious disease and patients should be isolated until the phase of communicability has passed. In this regard the danger that a patient presents is as much related to his social environment as to his bacteriological status. An older person with few social contacts can be discharged from hospital with an occasional positive sputum, a mother of young children must be repeatedly negative on gastric culture. Secondly, patients need a thorough indoctrination into all aspects of the treatment of TB and this can be most easily done in a hospital. If there is a major failure in our present therapeutic approach it is a lack of communication between physician and patient. In recent years we have overstressed drug regimens and neglected patient education. Thirdly, the anti-TB drugs are not without tocoxity and unpleasant side effects. An initial period of hospital care provides for a careful evaluation of the status of the TB infection and its response to the drugs being used. It also provides for the early detection of undesirable side effects of therapy.

When a patient is judged to be non-infectious and to understand the nature of his disease and the important facts of his therapy, he should be discharged from hospital. Prolonged hospital care beyond this point is not beneficial and indeed may be harmful.

As the incidence of tuberculosis declines case finding will become more difficult and expensive. The mass survey will no longer be a practical approach and our efforts will have to be directed to a special high risk group and will have to depend more and more on the case finding efforts of the private practitioner. For some groups, e.g., all school entrants, a mantoux test may become mandatory. For others, e.g., those beginning their old age pension, a chest X-ray may be required. All hospital admissions should be mantoux tested and the results made part of the permanent hospital record.

If the specialty of phthisiology disappears then all physicians will have to accept a greater responsibility for control of the disease. This will require a sounder training in the principles of case finding, follow up, and public health reporting. At the medical student level we can dismiss the specific details of chemotherapy—which will undoubtedly continue to change—but we should emphasize the principles of careful diagnosis and the follow up of contacts.

In essence, tuberculosis will become a disease of interest and fascination for all physicians instead of a nuisance to be pushed into a sanatorium.

Canadian Journal of Public Health

EDITORIAL BOARD

R. D. DEFRIES, M.D., *Editor*
J. T. PHAIR, M.D., *Associate Editor* CYNTHIA PALMER, B.A., *Editorial Assistant*

Representatives of Provincial Associations
B.C. R. H. GOODACRE, B.A.; *Alta.* E. S. ORFORD SMITH, M.B.; *Sask.* E. L. ABBOTT; *Man.* GLADYS ADAMS; *Ont.* M. C. CAHOON, M.ED.; *N.B.* A. E. WILBY; *N.S.* HAZEL ROLAND; *P.E.I.* BURTON D. HOWATT, M.D.
Chairman: E. J. YOUNG, M.D. *Secretary*: C. W. SCHWENGER, M.D.

THE MEDICAL RESEARCH COUNCIL OF CANADA IS ESTABLISHED

THE history of this most important development in the progress of medical research in Canada goes back to the interest of Sir Frederick Banting and the executive of the Canadian Medical Association who urged that medical research in Canada be co-ordinated through the National Research Council. In 1938, the Associate Committee for Medical Research was established. The first act of the Committee was to have Sir Frederick Banting survey the resources and facilities in the medical schools and hospitals of the Dominion. The Associate Committee was able in its first year to make grants in aid of research to investigators in these laboratories from its initial budget of $53,000.

During the years of World War II the Associate Committee co-ordinated war-time medical research problems and close relationships were established with the Department of National Defence and the Services. Three committees were formed, namely, Aviation Medical Research, Naval Medical Research, and Army Medical Research. The tragic death of Sir Frederick Banting in February 1941 deprived the Associate Committee of its chairman. Professor J. D. Collip was appointed to succeed Sir Frederick Banting and continued in this appointment until his recent retirement. Later, plans were made for the expansion of the Associate Committee into a division of medical research within the National Research Council. This forward step was taken after the close of the war.

The Division of Medical Research has made grants to universities, hospitals, and other institutions to assist in the conduct of research in the fundamental sciences. It was not possible for the division to provide funds for clinical research. Each year, the applications have greatly exceeded the funds provided by Parliament which, initially in 1947, amounted to $158,000. The extent of the growth of medical research in Canada is indicated by the provision of a budget of $2.3 million in 1961.

Provision was also made for the support of research by several government departments. In 1948, the National Health Grants Program, administered by the Department of National Health and Welfare, was inaugurated. One

of the most important of the grants in this program was the Public Health Research Grant. Its purpose was to promote research in the public health field, and to support research which did not fall within the field of the Medical Division of the National Research Council. Provision also was made for research support in the Mental Health Grant, the Child and Maternal Health Grant, and in certain other of the National Health Grants. In 1960, approximately $2\frac{1}{2}$ million were allocated for research under the National Health Grants.

Under the Department of Veterans Affairs and the Defence Research Board, medical research was undertaken relating to special problems in the fields of these agencies. The applications for support received by each of these bodies greatly exceeded the funds available. The need for increased support, therefore, has been very evident. To study this need the Hon. Mr. Gordon Churchill, Minister of Trade and Commerce, appointed a special committee in February 1958 to report on medical research in Canada and named Dr. R. F. Farquharson, former head of the University of Toronto's Department of Medicine, as chairman. The committee included Doctors D. E. Cameron, D. H. Copp, University of British Columbia; J. Doupe, University of Manitoba; G. H. Ettinger, Queen's University; R. Gingras, Laval University; E. Robillard, University of Montreal; and C. B. Stewart, Dalhousie University.

The report this committee presented at this session of Parliament is a valuable contribution to the progress of medical research. Surveying the extramural medical research programs of the Department of National Health and Welfare, the Defence Research Board, and the Veterans Research Board, the Farquharson Committee in its report endorses the work of these departments in their own special fields of interest and recommends: "such progressive increases as may be required for the normal growth of these programs." For each of these government bodies the appointment of an advisory committee of scientists is recommended to advise on matters of policy and to make recommendations concerning awards of grants for research. The report recommends, also, an interdepartmental medical research co-ordinating committee to unify policies and activities of these agencies and the new Medical Research Council. Such a co-ordinating committee has functioned informally during the past years and has been most valuable in reviewing applications which properly should have been addressed to other agencies.

The recommendation that the programs of research support be continued by the several government departments is wise and is supported by the experience of the past twelve years. It is to be remembered that the provision of grants for public health research is in accord with the responsibilities of the Department of National Health and Welfare as set forth in the bill establishing the Department in 1919 where specific mention is made of research. In the Veterans Affairs Department research funds granted by the Department have stimulated clinical research in the Department's hospitals. In the Defence Research Board a research program is essential and is a responsibility of the Board.

The Farquharson Report includes important recommendations for extending research facilities. During the next three to five years the sum of $25 million

is recommended for grants for new medical research laboratories and new university medical schools and $12 million for facilities at affiliated teaching hospitals. For the new Medical Research Council the present provision of $2.3 million is to be increased to $4 million and this amount is to be doubled by 1963, thus providing much more adequately for the development of medical research programs in Canada.

The report recommends the greater use of term rather than annual grants and more flexible use of funds. The limitations of annual grants have been a serious deterrent to many research investigators and a more liberal policy will be very helpful. The recommendations of the report are sound, practical, and far-reaching.

The new Medical Research Council will function under the administration of the National Research Council but will have virtually complete autonomy. Legislation to implement the recommendations of the Committee will be introduced in Parliament and an advisory council of fifteen members will be appointed.

The appointment of Dr. R. F. Farquharson to the Medical Research Council has been welcomed throughout Canada. Having had a rich experience in clinical medicine, possessing an intimate knowledge of medical research, and having unusual administrative ability, Dr. Farquharson is peculiarly well qualified to be the leader of medical research in Canada.

The future of the Medical Research Council of Canada is rich in promise.

STATUS OF POLIOMYELITIS VACCINATION USING LIVING ATTENUATED VIRUSES

IN this issue Dr. Andrew J. Rhodes, Chairman of the National Technical Advisory Committee of the Dominion Council of Health, Ottawa, provides medical officers of health of Canada with essential information concerning the development of live poliovirus vaccines and clinical trials that have been made.

The Advisory Committee was appointed in October 1959 by the Dominion Council of Health which, in turn, is the advisory board to the Department of National Health and Welfare. The Chairman of the Committee and Dr. Nagler visited Russia, where the most extensive trials of live virus vaccine have been made, and obtained valuable first-hand information. The Committee approved of the conduct of studies in Canada and these have provided information of great importance concerning the safety of the strains selected for use. The studies were made through the co-operation of the Connaught Medical Research Laboratories, University of Toronto, the Institute of Microbiology, University of Montreal, and the Ministry of Health of Quebec, with the assistance of the National Health Grants.

Dr. Rhodes presents in his paper the recommendations and comments of the Advisory Committee. Medical officers of health will read with great interest that the Committee recommends that vaccination with live virus vaccines of individuals of various ages in selected communities be now conducted on a

trial basis under the supervision of an epidemiologist, a clinician, and a virologist. When such trials have been made and enough experience has been gathered the Committee will consider recommending the use of the vaccine as part of the regular elective public health immunization program.

Vaccination with live polio viruses is recommended for use in the face of epidemic poliomyelitis. Salk vaccine cannot be expected to confer immunity quickly enough to be effective under such circumstances.

In looking to the future the Committee believes that there will be a place for both live and killed virus vaccine in routine immunization programs, and that each product will complement the other.

The Committee endorses the continued use of Salk vaccine in Canada for all age groups of the population. Salk vaccine should be given to babies, children, and adults. Dr. Rhodes urges public health workers to seek out actively those who are not presenting themselves for vaccination. The responsibility rests primarily with medical officers of health and this responsibility cannot be delegated to private physicians.

It is appreciated by all health officers that a continued program of education is absolutely essential if the protection of older age groups is to be achieved. The addition of Salk vaccine to diphtheria, tetanus and whooping cough antigens has assured the protection of infants, pre-school, and school children.

The implementing of the program of studies is a fine example of effective co-operation between federal and provincial health authorities, research institutions, and universities. Particularly noteworthy has been the contribution of the Ministry of Health of Quebec.

JUBILEE OF THE CANADIAN MEDICAL ASSOCIATION JOURNAL

IN 1867 the Canadian Medical Association was established but it was not until 1911 that the Association commenced the publication of its own journal. The need for a journal had been realized for some years but action was deferred because of the publication of the Montreal Medical Journal, L'Union Médicale, and several other medical journals in Canada, as well as the formidable problem of financing a new journal.

Looking back over the fifty years the success of the Journal has been due to the work and devotion of the distinguished physicians, Sir Andrew Macphail, Dr. A. D. Blackader, Dr. A. G. Nicholls, Dr. H. E. MacDermot, and Dr. S. S. B. Gilder, who served in succession as editors.

Last year, the Canadian Public Health Association had the pleasure of celebrating the Jubilee of both the Association and its Journal. Throughout the years the Canadian Medical Association and the Canadian Public Health Association have held a common purpose and have worked together for the advancement of the health of the people of Canada.

To the Canadian Medical Association the Canadian Public Health Association extends its heartiest congratulations on the occasion of the Jubilee of its Journal and expresses its appreciation of the Journal's achievements and great contributions.

INSTITUTE ON COMMUNITY EDUCATION FOR HEALTH*

AN Institute on Community Education for Health is being scheduled in conjunction with the 1961 National Convention of the Canadian Public Health Association. The Institute will be held at the University of Saskatchewan prior to the C.P.H.A. Convention from June 2 to June 5 and will reconvene in Regina after the national meetings for a final study day on June 9. The Institute, to be held in the Department of Social and Preventive Medicine, is jointly sponsored by this Department, the Department of Public Health, Province of Saskatchewan, and the Center for Community Studies, University of Saskatchewan.

The major *objective of the Institute* is to assess current concepts and methods in the diffusion of health information and to develop an approach to the understanding and educating of the public. The program is designed primarily to provide senior health workers (medical health officers, public health nurses, sanitary officers) with concepts and techniques for program planning and design. Specifically, the Institute will focus on five topics.

- History of health education and current involvement of public health personnel therein.
- Community change and its relationship to (a) public health hazards and (b) programs to deal with the educational implications of these.
- The role of the health educator on the public health team.
- Role relationships and process within the public health team. (How do the people in the public health team work together to bring about the process of community education in health?)
- Problems in program planning: the relative role of "the executives"—regional health officers, senior nurses and sanitary officers *vis à vis* the health educator. (What is the most effective way of introducing a health program to the public? How are the health education programs assessed?)

The *faculty of the Institute* will be headed up by George Rosen, M.D., Ph.D., Professor of Health Education, School of Public Health and Administrative Medicine, Columbia University. Other faculty will be drawn from the three sponsoring organizations and will include: Professor W. B. Baker, Director, Center for Community Studies; Dr. J. Wendell Macleod, Dean, College of Medicine; Dr. Alexander Robertson, Professor and Head, Department of Social and Preventive Medicine; and Mr. Christian Smith, Director, Health Education Division. In addition, several senior health workers in Canada will participate as discussion leaders.

The *program* is divided into four sections. First, all participants will receive a few selected readings on health education prior to their arrival at the Institute. Secondly, from June 2 to June 5 the program will provide (a) didatic reviews of concepts and techniques in health education, and (b) informal discussion periods in which the participants will develop methods to meet explicit health problems. During the third phase participants in the Institute will be asked to use the C.P.H.A. convention itself as an illustrative case in educational method. Tutorial meetings for Institute participants will be scheduled during the convention. In addition, the deliberations of the Institute will be the subject of a panel presentation at the convention. Finally, on the morning of June 9, the faculty and participants will assess (a) the validity of the developed concepts and methods, and (b) the Institute.

The Honourable T. C. Douglas, Premier, Province of Saskatchewan, has accepted an invitation to speak at a banquet during the

*Robin F. Badgley, M.A., Ph.D., and Alexander Robertson, M.B., D.P.H. Dept. of Social and Preventive Medicine, University of Saskatchewan, Saskatoon, Sask.

Institute. Other dinner speakers will include Dr. F. Burns Roth, President, C.P.H.A., and Dr. Hugh E. Robertson, President, Saskatchewan Branch, C.P.H.A.

Registration. The Institute will be held in Saskatoon at the University of Saskatchewan from June 2 to June 5 and will reconvene after the C.P.H.A. Convention, in Regina on the morning of June 9, for one half day only. To maintain program continuity and a balance in the professional affiliation of participants, registration will be limited to 40 individuals.

Room and board at a cost of $9.60 *per diem* will be provided by the University of Saskatchewan. The registration fee for the Institute is $25.00.

Application blanks and a brochure describing the Institute may be obtained by writing to: R. F. Badgley, Department of Social and Preventive Medicine, University of Saskatchewan, Saskatoon. Completed application forms should be returned to the above named by April 15.

News Notes

Federal

At a formal ceremony on December 19, 1960, in the Parliament Buildings, Ottawa, the Hon. J. Waldo Monteith, Minister of National Health and Welfare, and the Hon. Alphonse Couturier, Minister of Health for Quebec, affixed their signatures to an Agreement which extended provisions of the Hospital Insurance and Diagnostic Services Act to residents of Canada's oldest domain.

The Quebec program came into operation on January 1, 1961, and covers upwards of five million persons. As in the case of other provincial programs, it includes in-patient hospital services such as standard ward accommodation, necessary nursing services, use of operating room and anaesthetic facilities, radiotherapy and physiotherapy where available, drugs and surgical supplies, and diagnostic procedures including necessary interpretations where these are required. Services for out-patients are not provided at the present time but an extension into this area is envisaged.

The provincial legislation does not call for the levying of a premium or for the imposition of an authorized charge—more commonly described as a co-insurance or deterrent charge. Charges may be made, of course, for extra services involved in the provision of semi-private or private accommodation as well as for services of physicians and surgeons.

Costs of the Quebec program, as in the case of other provincial plans, are shared by the federal and provincial treasuries. The federal contribution on behalf of hospital insurance amounts to approximately 50% of national costs.

The signing of an Agreement with Quebec completed the process of implementing the Hospital Insurance and Diagnostic Services Act which began in March, 1958, with the arrangements with the Government of Ontario. The Ontario program, which came into effect on January 1, 1959, was preceded by the start of operations on July 1, 1958, in British Columbia, Alberta, Saskatchewan, Manitoba, and Newfoundland. Nova Scotia's plan got under way on January 1, 1959, with New Brunswick following on July 1, 1959, Prince Edward Island on October 1, 1959, the Northwest Territories on April 1, 1960, and the Yukon on July 1, 1960.

British Columbia

The appointment has been announced of Dr. Joseph L. Gayton as Senior Medical Officer for the City of Vancouver and the Metropolitan Health Committee of Greater Vancouver. Under the late Dr. Stewart Murray, Dr. Gayton had been assistant senior medical health officer since 1954, and prior to that had served as medical health officer for the Victoria-Esquimalt Health Department. In addition to his valuable background of experience in the public health field, he brings with him into his new appointment his well-known abilities as a teacher.

The untimely death of Dr. Stewart Murray, Senior Medical Officer for the Metropolitan Health Committee, has previously been reported in the Journal. In final testament to his 22 years' labours in the City's public health program, the Stewart Murray Health and Welfare Center was officially opened in Vancouver on November 18. Presiding at the brief ceremony, attended by some 300 persons, his widow, Mrs. Murray, unveiled a bronze plaque at the building's entrance. In turn, she was presented with a replica of the plaque by His Worship Mayor A. T. Alsbury on behalf of the City.

The new health center embodies features

for the application of public health services that Dr. Murray himself had been developing for several years. The health center serves a population of 70,000 of which 17,000 are children; with expansion of population in mind, it has been designed to serve over 100,000 people.

British Columbia's rheumatic fever prophylaxis program has received added impetus with its recent extension to children of the Greater Vancouver Metropolitan Area. It has been estimated that in this area alone there are some 500 children affected by the disease.

Mrs. Kay Marshall has been appointed senior nurse at Nelson in the Selkirk Health Unit in place of Mrs. Isabel Mulcaster who has resigned. Mrs. Marshall was formerly public health nurse at Kimberley.

Alberta

Dr. G. M. Little retired Dec. 31, 1960, as Medical Officer of Health for the City of Edmonton, a position he held for 24 years. After his studies had been interrupted by World War I, Dr. Little graduated from the University of Manitoba in 1921. He was appointed as medical officer of health to one of Alberta's first rural health units at Red Deer in 1932 and he obtained his Diploma in Public Health from the University of Toronto the following year. He has served on the Council of the Canadian Public Health Association and as President of the Alberta Division. He has also served for many years as a member of the Public Health Committee of the Alberta Division of the Canadian Medical Association.

Dr. George H. Ball, a graduate of Liverpool University, has been appointed to succeed Dr. G. M. Little as medical officer of health of Edmonton. Dr. Ball was appointed assistant medical officer of health for the city in 1952 after serving for four years with the Foothills Health Unit at High River.

The City of Edmonton has appointed Dr. W. A. Zacherl as its first full-time public health dentist. Dr. Zacherl is a graduate of the University of Alberta who obtained his Diploma in Dental Public Health from the University of Toronto in 1959. He has served as dental officer with the Jasper Place Health Unit since 1957.

Dr. Kevin A. Barrett has been appointed Assistant Medical Officer of Health for the City of Calgary. Since his arrival from Ireland in 1959, Dr. Barrett has served as Medical Officer of Health with the Minburn-Vermilion Health Unit.

Dr. Beryl Heap, a graduate of Leeds University, has been appointed as temporary Medical Officer of Health with the Peace River Health Unit.

A new Municipal Nursing Service has been established at Wabasca, about 250 miles north of Edmonton, to serve an isolated mixed community of some 1,800 Indians, Metis and Whites. Miss Laura Attrux, who has been the municipal nurse at Slave Lake for nine years, has been selected for this most responsible position.

Mrs. H. M. Steinhauer, who has served as senior nurse with the North Eastern Alberta Health Unit since its establishment in 1957, has resigned upon her husband's appointment to a position at High Prairie.

Saskatchewan

An interregional conference of members of regional boards of health was held recently in Regina under the chairmanship of Mr. N. A. Hall of the Swift Current Health Region. Dr. John A. Grant, professor of preventive medicine and public health, University of Puerto Rico, was the principal speaker and expert consultant. Other speakers were Dr. M. S. Acker, director of regional health services; Dr. F. Burns Roth, deputy minister of public health; and the Hon. J. Walter Erb, minister of public health.

The people of the town of Rouleau, 32 miles southwest of Regina, voted overwhelmingly in favour of water fluoridation in the plebiscite conducted in November. The vote was 94 in favour and 23 against. There are now 14 towns and cities in the province with fluoridated water. Fluoride tablets are supplied free of charge by the Department of Public Health on a one-a-day basis for preschool children in areas where no communal piped water supply is available.

A seminar for parents of mentally retarded children will be held at the Saskatchewan Training School in Moose Jaw, Feb. 21–23, 1961. Announcement of the seminar was made jointly by C. Grady, Saskatoon, president of the Saskatchewan Association for the Mentally Retarded, and Dr. A. J. Beddie, superintendent of the Saskatchewan Training School.

Mr. W. H. Howes has been appointed as chairman of the Golden Anniversary Committee of the Saskatchewan Anti-Tuberculosis League which is observing its fiftieth year in 1961. Mr. Howes and Mr. Ken More, M.P., President of the League are directing planning for a fitting celebration.

The following public health nurses joined regional health services recently: Miss Teresa Simpson, Buffalo Narrows; Mrs. Kathleen Heesing, North Battleford; Mrs. Vivian Price, Prince Albert; Mrs. Lillian McCallum, Rosetown; Miss Ellen Mahan, Yorkton; Mrs. Donaldina Percy, Yorkton.

Public health nurses Miss Mary Alcock Mrs. V. Bannister, Miss H. Dumanski, Miss F. Hunt, Miss L. Neibrandt, Miss I. Nelson, Miss M. Schindler, Miss Jean Cummine, and Miss J. G. MacKay have obtained leave for university training in various universities.

Manitoba

The Health Department has now moved into its new home, Norquay Building, Winnipeg. The ten-storey, fully modern structure is completely equipped with modern fixtures and steel modular furniture of fine line design. It is expected that the various other government departments will be located in the new building by mid-February.

Mr. J. Warrener, Bureau of Public Health Engineering, attended a three-week course at the Robert E. Taft Public Engineering Centre in Cincinnati, Ohio, during November.

Miss M. Fryers has been appointed as a nursing consultant with the Public Health Nursing Services.

Mr. M. Zubrecki, formerly with the Accounting Division, has been appointed Administrative Officer with Extension Services to assist Dr. W. Watt.

Guest lecturer at the Senior Nurses and Administrators Institute, November 21 to 25 was Mrs. Loretta C. Ford, Assistant Professor, School of Nursing, University of Colorado. Sponsored by the Health Department and the School of Nursing, University of Manitoba, the Institute was under the auspices of the Adult Education and Extension Department, University of Manitoba. Forty-one were registered for the Institute.

Prince Edward Island

On the night of Dec. 8, 1960, the building housing the administrative offices and seven divisions (including the Provincial Laboratories and Red Cross Transfusion Laboratory) of the Department of Health took fire. At the height of the blaze it appeared that the entire interior would be destroyed but the records and files were salvaged. A considerable amount of furniture and equipment was lost but, fortunately, the Laboratories which were in the back part of the building furthest from the fire lost no equipment.

The Laboratories and the Division of Vital Statistics were able to get back in operation the next day. Space was rented in the Dominion Building and the dirty and laborious task of moving the other divisions was begun, with the kind co-operation of the Department of Public Works.

The front part of the building which was originally a house was a total loss which means that the Public Health Nursing, Cancer Control, V.D., Dental and Sanitary Engineering will be located elsewhere for some time. The Administrative Division which includes the offices of the minister, deputy minister, assistant deputy minister, accountant, and the main business office, will return to the building when renovations are completed.

Books and Reports

THE DISEASE CONCEPT OF ALCOHOLISM. *E. M. Jellinek, Hillhouse Press, New Haven, Conn. Distributed by Publications Division, Yale Center of Alcohol Studies, New Haven, Conn., U.S.A. 1960, 246 pp., $6.00.*

Dr. E. M. Jellinek needs no introduction for his research studies in alcohol problems have laid the groundwork for a conception, based on truly scientific principles, of alcoholism as an illness. This is a new book based on a study of attitudes throughout the world toward the concept of alcoholism as a disease. The project was made possible by the Christopher D. Smithers Foundation. His new classification of "the alcoholisms" combines the various psychological, social, and physical forces to show the ways in which various combinations may produce well defined types of alcoholics. The etiological theories of alcoholism are extensively considered in the light of the most pertinent scientific findings.

For all who are seriously interested in this major public health problem, this book is essential.

THE CHEMICAL ANALYSIS OF AIR POLLUTANTS. *Morris B. Jacobs, Ph.D. Chemical Analysis Series, Vol. 10. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N.Y., U.S.A., 1960, 430 pp., $13.50.*

This book is the tenth in a series of monographs on analytical chemistry and its applications. It covers a wide range of atmospheric pollutants and includes chapters on radiochemical determinations, motor vehicle exhaust gas analysis and air contaminant monitoring instruments. The subject matter is up to date and gives a reasonable account of generally accepted analytical and sampling techniques. The text is further clarified by numerous examples of calculations and by the generous provision of line drawings and photographs. The chapter dealing with radiochemical determinations contains useful theoretical information, particularly in respect of counting procedures.

"The Chemical Analysis of Atmospheric Pollutants" is rather more than just another manual of analytical chemistry, for it serves the purpose of an introduction to modern techniques applied to problems of environmental atmospheric pollution, both for those engaged in research and for those making routine measurements. Dr. Jacobs' book is a very timely and useful laboratory companion.

PHOTOGRAPHY IN MEDICINE. *Arthur Smialowski and Donald J. Currie, M.D., M.Sc., F.R.C.S.E., F.R.S.C.(C), D.S., F.A.C.S. Ryerson Press, Toronto. 1960, 330 pp., $14.50.*

This is an important Canadian contribution to medical photography. It is based on the work of the Photography Department of St. Michael's Hospital, Toronto. It presents by description, drawings and examples the many techniques in photography as applied to all branches of medical practice and investigation. Full page illustrations face large line drawings which explain the technique used. Short clinical summaries and photographic techniques accompany clinical photographs. The book is directed to photographers who have a working knowledge of photography and it is the first comprehensive text to deal exclusively with the many applications of photography in the science and practice of medicine.

Research scientists will find that much of the information in this book will apply to photography in their fields.

CHILD GUIDANCE CENTERS. *By D. Buckle and S. Lebovici (World Health Organization, Monograph series, No. 40). Distributed by Queen's Printer, Ottawa, 1960, 133 pp., $4.00.*

The authors, a psychologist and a psychiatrist, wish to make known the various activities of the child guidance centers and their usefulness. They have drawn on the papers presented and the discussions held at a seminar which took place in 1957 in Lausanne. This monograph reflects the various opinions held on this subject and considers the organization of child guidance centers from many different viewpoints.

THE WORK OF WHO, *1959. Official Records of the World Health Organization, No. 98. Distributed by Queen's Printer, Ottawa, 1960, 283 pp., $2.00.*

The annual report of the Director-General, Dr. M. G. Candau, to the World Health Assembly and the United Nations is a document of great interest. In his introduction he notes growing evidence of the determination of world leaders to devote more of their countries' resources to helping nations still in the early steps of technological and economic development to raise their standards of living. He points out that communicable diseases remain one of the world's most serious health problems.

A field of special interest is the medical research program. The WHO "service to research" will be an important element of the program and will include standardization of nomenclature, techniques and equipment, and the expansion of the WHO system of international reference centers, together with grants-in-aid and training awards. Emphasis is given in the report to the vast program for the improvement of community water supplies. Part II of the volume deals with the work carried out in the six WHO regions. Part III presents co-operation with other organizations and the expanded program of technical assistance that has meant so much to many lands.

EMPLOYMENT SERVICE

Advertisements may be inserted in the Employment Service column for two months for a charge of $10.00. The cost of each consecutive insertion after the first two months is $5.00. Insertions in the PERSONNEL AVAILABLE section are free-of-charge to individual members of the Association. The fee for non-members is $5.00 for two insertions. Advertisements in the Employment Service column are limited to 70 words.

Medical Officer required for well established health unit. Must be eligible for registration in Alberta and must possess a D.P.H. Starting salary commensurate with experience. Three weeks annual leave, car allowance and pension plan. Apply to: Minburn-Vermilion Health Unit. Vermilion, Alberta 2–3

Director, Public Health Nursing, Provincial (100,000 population). Qualified and experienced in supervision and administration. Apply, giving references, etc., to: Director, Public Health Nursing, Box 3,000, Charlottetown, P.E.I. 1–2

Clinical Assistant to Health Unit Director, to do primarily immunization and baby clinics. Ample opportunity to gain general public health experience. Salary $6,000 per annum with car expense allowance, pension plan, and group insurance. Three weeks vacation plus statutory holidays. Apply to Medical Officer of Health, Lambton Health Unit, Sarnia, Ont. 2–3

Public Health Nurse, qualified, required for the Kapuskasing area. Bilingual preferred. Unit provides car. Other benefits include pension plan, sick leave, Ontario Hospital Association (Unit pays half), 4 weeks vacation, good salary. Apply to Miss Mary Hedican, Secretary-Treasurer, Porcupine Health Unit, 164 Algonquin Blvd. East, Timmins, Ont. 2–3

Public Health Nurses for generalized public health nursing service in suburban and rural areas. Minimum salary $3,600 per year, car allowance, pension plan and other benefits. Apply to Dr. D. G. H. MacDonald, M.O.H., 44 Nelson Street West, Brampton, Ont. 2–3

Registered Nurse preferably with public health training or experience needed for rural health unit in Alberta. Salary range according to qualifications and experience. Transportation is provided on duty and off duty within the health unit area to an extent. Sick leave, holidays, and pension plan available. For further particulars apply to: Minburn-Vermilion Health Unit, Vermilion, Alberta 1–3

Sanitary Inspector, bilingual, with C.S.I.(C), required by Prescott and Russell Health Unit. Minimum salary $3,500 with annual increments. Five day week, car allowance. Hospital plan and sick leave. Apply to Dr. R. G. Grenon, Director, Prescott and Russell Health Unit, Hawkesbury, Ont. 1–3

ÉCOLE D'HYGIÈNE
UNIVERSITÉ DE MONTRÉAL

Enseignement donné en français pour la formation professionnelle des diverses catégories d'hygiénistes

DIPLÔMES EN HYGIÈNE PUBLIQUE (DHP), EN HYGIÈNE DENTAIRE PUBLIQUE (DHDP) ET EN HYGIÈNE VÉTÉRINAIRE PUBLIQUE (DHVP)

Cours de base d'un an offert aux médecins, aux dentistes et aux vétérinaires. L'École est "accréditée" par *l'American Public Health Association* pour décerner le DHP. Le programme du troisième trimestre comporte des études en dentisterie préventive pour le DHDP; en médecine vétérinaire préventive et en épidémiologie animale pour le DHVP.

CERTIFICAT EN HYGIÈNE PUBLIQUE (CHP)

Cours offert aux autres gradués universitaires qui sont intéressés à la santé publique et peuvent fournir la preuve d'une expérience professionnelle satisfaisante. Les candidats suivent un programme d'enseignement adapté aux besoins de chacun. Le certificat en hygiène publique comporte mention lorsqu'il y a spécialisation.

DIPLÔME D'INFIRMIÈRE-HYGIÉNISTE (DIH)

Cours d'un an offert aux infermières munies du diplôme d'un université reconnue par l'École ou ayant droit de pratique conféré par une association professionnelle. Appelées à coopérer avec les autres hygiénistes comme membres d'une même équipe, les infirmières reçoivent en commun avec eux une partie de leur formation et suivent séparément les cours spéciaux qui leur sont destinés.

MAÎTRISE EN ÉDUCATION SANITAIRE (M.Éd.S.) ET LICENCE EN HYGIÈNE (LH)

Cours d'éducation sanitaire destiné au personnel enseignant et spécialement adapté à ses besoins. Pour la maîtrise, cours d'une année académique à temps complet et d'un stage d'un an, avec présentation d'un mémoire; les non bacheliers, après l'année académique, reçoivent un "diplôme en éducation sanitaire". Pour la licence en hygiène, les cours se donnent à temps partiel en quatre termes.

BACCALAURÉAT EN ÉDUCATION PHYSIQUE ET RÉCRÉATION (B.Éd.P.R.)

Cours destiné à ceux qui désirent se consacrer à l'éducation physique et à la récréation dans les institutions d'enseignement et les organismes de loisirs. Comme condition d'admission on exige quatorze années de scolarité (avec un minimum de douze années on peut être admis comme candidat à un diplôme).

MAÎTRISE EN ÉDUCATION PHYSIQUE ET RÉCRÉATION (M.Éd.P.R.)

Conditions d'admission: Baccalauréat en Éducation physique et Récréation. Une année de cours avec présentation d'un mémoire.

MAÎTRISE EN ADMINISTRATION HOSPITALIÈRE (M.A.H.)

Cours destiné au personnel occupant de hautes fonctions en direction médicale ou en administration hospitalière. Pour y être admis il faut être porteur d'un baccalauréat. Le cours est de deux ans, dont une année d'enseignement académique et une année de résidence. Le candidat doit présenter une thèse.

COURS POUR INSPECTEURS SANITAIRES

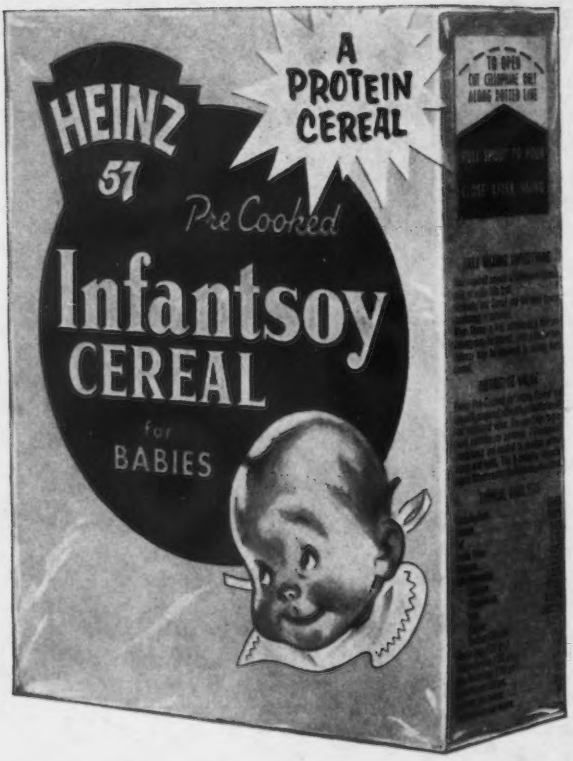
Cours de quatre mois offert aux inspecteurs sanitaires. Le programme d'enseignement débute pendant la saison d'hiver par trois semaines de cours d'initiation à la bactériologie, à la chimie et à la biologie; il se prolonge ensuite parallèlement au second trimestre, à l'horaire duquel sont inscrits tous les cours portant sur la salubrité; il comprend un stage en inspection des aliments et se termine par un cours de deux semaines à l'École de Laiterie de Saint-Hyacinthe.

MAÎTRISE ÈS-SCIENCES ET GRADE DE Ph.D.

Les porteurs d'un baccalauréat "cum laude" peuvent s'inscrire comme candidats à la maîtrise ès-sciences ou au grade de Ph.D. dans une des spécialités relevant de l'Hygiene publique. Pour la maîtrise ès-sciences, une année de scolarité avec présentation d'une thèse originale. Pour le grade de Ph.D., deux autres années de recherches avec présentation et soutenance de thèse.

Le prospectus de l'École sera envoyé sur demande.

Doyen et directeur des études: Docteur Armand Frappier. C.P.6128
Secrétaire: Docteur Roger Foley MONTRÉAL



Another Step Forward in Infant Nutrition

THE MOST AGREEABLE CEREAL FOR BABIES. Infantsoy is an ideal all around cereal. It is completely digestible and well-tolerated even by very small infants. The exceptionally high content of protein, iron and calcium in Infantsoy Cereal provides abundant food value in proportionately small bulk servings.

SAMPLES are always gratefully received by mothers, and Heinz are pleased to make professional samples available to you. Write to Heinz Baby Foods, Professional Services Dept., Leamington, Ont.

BFM-261A

HEINZ BABY FOODS 57